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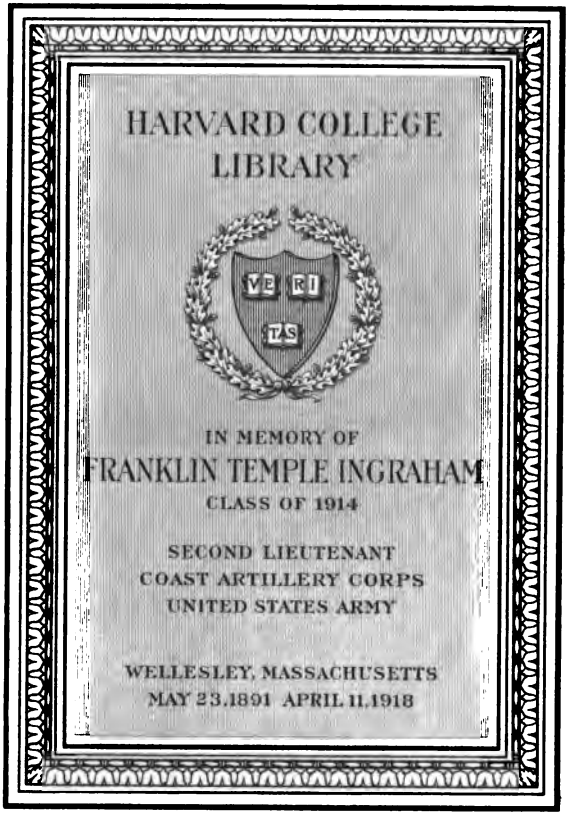
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TRANSACTIONS

OF THE

Natural History and Antiquarian Society

OF

PENZANCE;

ESTABLISHED IN 1839.

VOLUME I.

1845—1850.

Non fingendum aut excogitandum sed quid Natura faciat observandum.

Bacon.

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F. T. VIBERT, PRINTER, BOOKSELLER, &c.

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PREFACE.

THE importance of founding such a society as our own, for the cultivation of the science of Natural History, and for the investigation of the Antiquities referring to the early inhabitants of our county, is so self evident that nothing in the form of advocacy is required. Situated in the south-western extremity of the kingdom; surrounded by the ocean, and thus offering favourable opportunities for the observations of the migrations both of birds and fish; and having numerous objects of antiquarian interest scattered around us; are circumstances which seem to point out our locality as more than usually favourable for the formation of such an Institution. It was for such reasons that our society was established; and for the preservation of such objects as were found in west Cornwall the museum was added. An Address was issued and the objects of the society laid before the public. In presenting, therefore, to the members the first volume of our Transactions, it seems desirable that something like a review should be taken of the character of our past labours, and of the success with which they have been carried on. If we expect further support, it is but right that we

should examine and see whether our performances have equalled the anticipations with which we set out, and whether our knowledge is capable of being turned to some useful account. Nothing is more common at the commencement of an undertaking than an enthusiasm, which soon cools down, and ends in the disappointment of all the hopes originally entertained. What is begun with zeal, frequently ends with neglect. To the mere collecting objects of natural history has been added the study of their habits and physiology,—points of great interest and importance in all investigations of Nature. To the industry of our collectors, our museum will testify; to the spirit with which these subjects have been studied, the present volume must be the evidence. It may be remarked, however, that the industry of our members has outrun our means of accommodation. In addition to what we already possess, collections of the *Crustacea*, perfect as it regards Cornwall, *Zoophytes*, *Mollusca*, and the *Echinodermata*, are ready for our museum when space can be provided; our efforts are circumscribed only by our limited resources. The study of natural history is not, as it is commonly supposed, fitted only for the curious,—it is of importance as it regards the industry of our population. The appearance and disappearance of some creatures affect the welfare of thousands; destitution or comparative affluence are the results apparently of accident. Any study, therefore, that will tend to elucidate their history and habits cannot be useless, and ought to claim the attention even of *cui bono* men; for by the knowledge of the habits of such creatures as enter, either directly or indirectly, into our commercial prosperity, useless exertions and expenditure may not only be avoided, but our efforts may be more definitely directed into those channels most likely to be productive of good results. Every thing connected with the pilchard, for instance,

must be interesting to the Cornishman; and every effort made to study its history, or to ascertain its habits, and the extent of its migrations, whereby the fisheries established for its capture may be rendered less speculative and more economical, ought to be encouraged. Among the Papers within these pages will be found several on this subject, together with statistical information as to the quantities exported, and the places to which they are sent. The periodical character of their visits are proofs that they are governed by external influences, and these are legitimate subjects for investigation. By ascertaining the times and seasons at which they come and go, those ignorant and expensive watchings, which are kept up for weeks, with no prospect of success, may be avoided.

To the Agriculturist, the knowledge of natural history would be invaluable. The grubs, worms, insects and mildew, so frequently destructive of his crops, are included in the study of natural history, and no one is so powerful in the means of supplying a remedy as those who know the nature of the disease. In the present volume is a case in which a large assortment of young fruit trees were threatened with a destruction, that was at first invisible; the subject was carefully examined, its nature discovered, and the remedy effectively applied. While knowledge thus enables us to meet a difficulty at the least possible expense, and within the shortest time, it will also tell us when to stop. If the farmer knew but the value of the rook and the mole on his land he would never expend so much time and money in their destruction,—he would find them among his best friends; or even if he did not, he would be able to give a satisfactory reason for his actions.

Labours such as these shew that the useful has not been sacrificed to the scientific, both have been harmoniously blended. Science has been made the mode of investigating Nature, of ascertaining

facts, and so arranging them as to make them available for ordinary purposes.

Referring exclusively to the scientific portion of our labours, it must always be a matter for congratulation to be able to add a single species either to our Fauna or our Flora; but it must be doubly interesting when in addition we are able also to add it to science. It has been our good fortune to be able to do both, beside recording the appearances of others exceedingly rare. Among the birds we have the fire-crested regulus, white stork, &c., to be added to our list. But a complete catalogue of this portion of our Fauna will be found in these pages. Among the fish the spotted mackerel is figured and described, for the first time, and the long-finned tunny, grey shark, and Boyer's smelt are added to the Cornish Fauna. The list of the *Lepidopterous* insects, contained within the following pages, will be found far more extensive than any hitherto made; and the majority of the specimens are in our collection. Among the *Zoophytes* three at least are described for the first time, while several others are new to the west of England. Beside these there are several communications on the obscure subject of their physiology. In botany we have obtained a long list of the mosses of Penwith, beside catalogues of the *Algæ* of our shores. There is also a Paper on the subject of the disease which has been so destructive to the potato.

As a branch of general education, natural history might be cultivated with advantage: it is fitted for all ages, and all degrees of intellect. While the higher generalizations require the acumen of great minds, yet it is easily adapted to the intelligence of children; it makes them observant and discriminating,—observant of the external Nature by which they are surrounded, and discriminating in exercising the judgment in the detection of differences of closely

allied objects. In proof that it is suited to the intelligence of youth, reference need only be made to a Paper contained within these pages, and to many of the objects now added to our museum. As an intellectual recreation for the young we hope, therefore, to see both our means and our accomodations increased.

In the Antiquarian department there has been no lack of zeal. No visiter to our museum will fail to notice the admirable models of the cromlêhs and other monuments which are there deposited: they are minutely accurate; they are made to scale; and they are worthy of better positions than we are able to give them. Our Transactions also contain many Papers on the traditions, manners, and customs of the ancient inhabitants of our county, which will be found highly interesting.

So far then as our resources would allow we have endeavoured to carry out the intentions spoken of at our establishment; if there be any deficiency, it rests not with the inactivity of the members, but with the narrowness of our resources. Let our means be increased, let us provide ample accommodation for our specimens, and we possess the power of making this society one of the most valuable of the local institutions in the kingdom.

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OBJECTS AND LAWS

OF THE

PENZANCE

NATURAL HISTORY SOCIETY;

WITH LISTS OF THE

DONORS, SUBSCRIBERS, AND OFFICERS.

Instituted 20th November, 1839.

PENZANCE;

PRINTED BY E. PADDY, BOOKSELLER, ETC.

—

1840.

ADDRESS.

THE principal object contemplated in the formation of this society, is the cultivation of the Science of Natural History, by means of an institution, whereby the knowledge of individuals may be concentrated for the general advantage. Although at the farthest extremity of the Kingdom, its wild shores and waves but a few miles apart, this neighbourhood claims, from its position, climate, structure, and other circumstances, a distinguished place in the history of natural science: and abounds in objects favourable to the study of botany, ornithology, icthyology, and conchology,—to say nothing of mineralogy and geology, which have been pursued by another Society. There are, doubtless, many in this place and neighbourhood, who possess a knowledge of these subjects; but many others, for want of the needful facilities and helps, have been discouraged, and have made but little progress. It is, therefore, proposed to form a Museum, illustrative of the Natural History of this County, and as well that of foreign countries. The collection and preservation of the valuable antiquities of Cornwall will be another object of the Society's earnest care, which will also be extended to objects of general interest. The inhabitants of this town and its vicinity have so often held a distinguished place in the field of useful and honourable exertion, that it seems hardly necessary to plead the precedent of other towns for the formation of a local Museum. The human

mind requires excitement; in the present age it thirsts after it;—and in the establishment of this Society, in the communications which may be expected from time to time from abroad, as well as from home, in the discussions which will be raised, and in the lectures which may be delivered by some of its members—will be found, we trust, not only the excitement, but the means of carrying on the inquirer to the highest attainments. Such institutions are probably amongst the principal causes by which such an impetus has been given to science in general within the last few years.

The situation and increasing trade of this town are peculiarly favourable to an intercourse with other countries: and for receiving, through the exertions of our intelligent agents and other means, many of their productions, as well as articles illustrative of the habits, customs, and pursuits of the inhabitants. And we may anticipate that within a few years, or less, contributions, numerous, various, and beautiful, will flow into our Museum from many a distant land and sea, island and wilderness—for is not the period near, when the fast increasing power of steam will cause no city to be foreign, no land strange, no region unknown?

To the sea and its shores, we must look for the largest and most valuable contributions to our collection. In the department of icthyology, it appears from Mr. Yarrel's excellent account of British fishes, that a large proportion of the rarer species were found in our bay. Within a few years past, two sharks have been caught near the coast, one of which, the spinous shark, had been previously unknown on the British shores; and of the other, (the hammer-headed shark) Mr. Yarrel quotes but a single example besides. Our seas are also rich in various species of coral, many of which, it may be hoped, will find their way into this Museum. Besides the shells, which are common on the coast of Cornwall, many natives of the tropics have been found in the Western coves; and as our seas and shores are rich in conchology, in crustaceous and

other invertebrate animals, and in zoophytes, a considerable number of specimens may probably be obtained, either on the coast, or from the fishermen and dredgers, who now throw them away; but who, if stimulated by the hope of reward, would gladly preserve them for this Society.

To the same sources the Ornithological department will be principally indebted, as the sea and shore birds are far more plentiful than others. Of the smaller land birds, we cannot expect a great variety here; and must, therefore, be dependant on our friends in more inland and wooded districts. Our position, however, in this most southern and western extremity of the island, is not without its advantages. Projecting so far into the Atlantic, our coast often becomes the resting place of birds of passage, and stragglers from other quarters of the world—of which many rare and interesting species have been met with. The extent of coast and moorland, together with the vallies and marshy grounds by which we are surrounded, will probably afford facilities for procuring, and for studying the habits of a greater variety of species, than can be met with in most districts of equal dimensions.

In botanical productions, our shores and sea-banks are rich; and it is hoped that the ladies of this place and neighbourhood, and its numerous visitors, while they pursue an elegant amusement, will often receive our grateful thanks for their contributions to the Museum. Our land flora, though not an extensive one, can boast of several plants—which are very rarely to be met with in other parts of the kingdom. It will be sufficient to instance the Erica vagans, the Cynodon dactylon, Adiantum Capillus Veneris, and the Arthrolobium Ebracteatum, lately discovered in Scilly.

Entomology, perhaps, does not afford so large a field as the other branches which have been noticed; but a cursory inspection of collections which have been made here, will shew that a greater number and variety of insects have been found in this neighbourhood, than even

an Entomologist would have expected. A scientific correspondent, in his account of an entymological tour made a few years since into this district, alludes to a large water beetle, Cybister Roselü, which was captured in the Marazion marshes ; he says, " it is an insect of which there was only a single authenticated British specimen besides." Again he adds that, " he took some very good coleoptera, in Ireland ; but the collection he made in the neighbourhood of Penzance, and which he sent to a first-rate Entomologist to have named, turned out to contain nine entirely new species, besides four others new to Britain, and a great many very rare ones. One of the Carabideous beetles will form a new genus, and a beautiful Casoidas, which he took in a field behind Trenear, is an entirely new insect."

With respect to objects of general interest, we need only at the present refer to one class, illustrative of the antiquities of Cornwall, of its aboriginal inhabitants, of its Roman invaders, and of its early mining operations. Many relics, coins, instruments of war, implements in early use in the stream-works, vases and urns, often containing ashes, are from year to year brought to light, but for want of a proper public depositary, are either lost or destroyed, consigned to the obscurity of private cabinets, or carried out of the county.

Such are the objects of this Society, to which the support of the inhabitants of this town and neighbourhood is earnestly invited. In this age of enterprize, improvement and change, whose rapidity nothing can arrest, we cannot afford to pause. The memory of the past, the excitement of the present, cannot hide from our view the more brilliant future, for which we should be prepared. There is a resistless influence silently rising around us, felt in the hamlet as in the town, beside the cottage hearth as in the home of luxury—that of intellectual power. Let its exercise be directed to the acquisitions here offered, which will lead to a greater refinement in manners, morals, and taste, and a spirit of research and observation, whose sources cannot be dried up.

In order that this Museum flourish permanently, it will be necessrary that the care of many a member be given, not to its various departments, but rather that of each member to his own favorite branch of study. The devoted pursuit of one path of attainment, is almost sure to master it. How many have gained an eminence in the world, in literature, travel, and science, for which, in reviewing their career, it is not easy to account; till we perceive it was the patient enthusiasm, the ceaseless hope, still turned to the long-loved object, that enabled them, even with moderate talents, to achieve at last a splendid success. The picture is impressive of many a man, who, happy in his fortune and his home, has gone forth lately to unexplored lands, in the impassioned pursuit of Natural History—to toil, to suffer, and often to sink alone,—his only recompense the discovery of new plants, flowers, fossils, birds, and reptiles. With this recompense, no solitude was terrible, no home was desolate. It was this spirit which the celebrated Dr. Ruppell carried with him to the rocks of Arabia Petra, the burning sands of Abyssinia and Kordofan, and the city of Frankfort is entirely indebted to his researches for the high rank she holds, even in Germany, in the possession of a splendid Museum of Natural History. After having thus sacrificed his fortune for the advancement of science, he gave his collection, peculiarly rich in the department of Zoology, to his native town. Eminent Naturalists are now exploring the interior of Asia Minor, hitherto so imperfectly known, Australia, Guiana, Western and Southern Africa. Even from the vallies of Cashmire, Thibet, and the Indus, have recently arrived various specimens in zoology, in animals and fishes, and a collection of beautiful drawings. Many of our members possess the facilities which an extensive correspondence gives, of obtaining contributions that will be delightful to place in our cabinets. Many have it in their power to communicate information that will be highly useful, at a small expense of time and labour: a single interesting fact, a single specimen, or new variety of any useful substance or production, will be

gladly received. The liberality, the lively interest already shewn towards this Institution, will not be in vain to any. We cannot trace the retreats and recesses of nature, and listen to her many voices, without a deep feeling of the beautiful and the magnificent—and a juster perception of that Spirit of wisdom, who awoke this exquisite world out of matter, that it might minister to us of its hidden treasures.

RULES.

MEMBERS.

1. Every person desirous of becoming a member of the Society, shall be recommended by at least two members: and this recommendation shall be placed in some conspicuous part of the museum, seven days at the least before the day of meeting, at which the election is proposed to take place.

2. During the first year members shall be elected by the committee, but afterwards at ordinary general meetings by ballot, unless at the expiration of a year this power shall be again vested in the committee for the same by the decision of a general meeting; the dissent of the majority of the members voting in committee; or of one-fourth of those voting at general meetings, shall exclude candidates.

3. Every person so elected shall pay an annual subscription of ten shillings, which shall be due on the first of January; or five pounds as a life subscription.

OFFICERS.

1. The management of the Society's affairs shall be vested in a President, three Vice-Presidents, a Treasurer, four Secretaries who shall also be Curators of the Museum, and ten other Members of the Society, who shall all be elected yearly at the annual meeting.

2. The Officers and Council shall meet at least once in every six weeks, for transacting the business of the Society, and for making regulations for the proceedings on matters not herein comprized.—Such regulations to be in force until the next annual general meeting, and no longer.

3. No business shall be transacted unless seven at least of the officers and council be present. Every matter discussed shall be determined by the majority of those voting; and in case of an equality, the chairman shall have a second or casting vote.

4. The Officers and Council shall have a discretionary power as to the mode of receiving subscriptions; and all orders for the payment of money shall be made at meetings of the Officers and Council, and shall be signed by the chairman and one of the secretaries.

5. In the event of official vacancies occurring before the annual general meeting, the Officers and Council are empowered to make provisional appointments, which shall be in force and effect until the next annual general meeting.

MEETINGS.

1. The Ordinary General Meetings of the Society shall be held twice in every year: it shall be deemed a sufficient notice, of any such meeting, to have a notification of the day, hour, and place of meeting, affixed to some conspicuous part of the Museum, and in a similar spot in the public library.

2. The Annual General Meeting of the Society, for receiving the Report of the Officers and Council, auditing the Accounts, election of Officers and Council, and for transacting any other business relating to its concerns, shall be held some day of the second week in September, and at least one week's notice of it shall be given by

advertisement in the Cornish newspapers, or in some of them, and by the publication of the same in manner aforesaid.

3. At the general meetings, communications to the Society may be read, or lectures delivered; and after the reading or delivery of these, a *reasonable* time shall be devoted to discussion, or remarks on them. All presents made to the Society since the preceding meeting shall also be laid on the table; and any other business submitted which the Officers and Council may deem fit.

4. The ordinary General Meetings of the Society shall be open to all Members and their families resident in the same house; and to all visitors and strangers introduced by a member of the Society.

5. On a requisition to the President, to convene a special general Meeting, and setting forth the objects which it is proposed to consider, signed by ten members at the least, he shall direct the Secretaries to give public notice of such special Meeting, in manner aforesaid, and to specify the subjects which it is intended to discuss, and these, and no other, shall be then determined. Ten days public notice at least shall be given of all such special general Meetings.

6. On a notice signed by ten members at least, specifying the objects to be considered, it shall be competent for any general Meeting to alter any of the existing Rules of the Society, or to add new ones. The notice to be affixed to some conspicuous part of the Museum as aforesaid.

MUSEUM.

1. The Museum shall be held in trust for the benefit of the Members.

2. All Members of the Society, and their families residing in the same house, and all visitors, and strangers introduced by a member, shall have access to the Museum at all times when it is open.

3. The Officers and Council shall during the first year, have a discretionary power to fix the times for opening the Museum.

4. The management and arrangement of the Museum shall be entrusted to four Curators, (who are also the Secretaries,) to be elected annually as aforesaid: and the Officers and Council shall be at liberty to appoint one or more Sub-Curators, who shall be paid, either by annual salary or salaries, or in any other mode the Officers and Council may think best, which Sub-Curator or Curators shall hold office during the pleasure of the Officers and Council.

5. All donors of specimens to the Museum, or parties making scientific communications to the Society, shall have access to the Museum in like manner with the Members of the Society, but they shall not be at liberty to introduce visitors.

6. The Curators shall be at liberty to make exchanges of duplicate specimens with other Societies, or individuals; such specimens only excepted as have been given to the Society, with restrictions to the contrary.

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	£.	s.	d.
Mrs. Bedford	1	0	0
Mrs. T. S. Bolitho	1	0	0
Batten, John	2	0	0
Batten, Rev. Henry	1	0	0
Bedford, John S.	1	0	0
Boase, John J. A.	2	2	0
Bolitho, Thomas	2	0	0
Bolitho, William	5	0	0
Bolitho, Thomas S.	2	0	0
Bolitho, Richard F.	1	0	0
Buller, Rev. John	5	0	0
Carne, Joseph, F.R.S., F.G.S., &c.	5	0	0
Carne, John	2	2	0
Ellis, Carteret J. W., M.A.	2	2	0
Gilbert, D., D.C.L., Oxon, V.P.R.S. &c. *(dec)*	10	10	0
Griffith, Rev. Edward	1	0	0
Henwood, W. J., F.R.S., F.G.S., &c	1	0	0
Ley, Edwin	5	0	0
Long, Richard	1	0	0

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	£	s	d
Millett, John N. R	2	0	0
Mitchell, David W	1	0	0
Pascoe, James	1	0	0
Paynter, John	1	0	0
Pearce, Richard	1	1	0
Pendarves, E.W.W., M.P., F.R.S., F.G.S., &c	10	0	0
Peters, Rev. M. N	5	0	0
Praed, William T., M.P., &c	10	0	0
Robyns, Major, R.M., C.H	1	0	0
Rodd, Edward Hearle	2	0	0
Roscorla, John	1	0	0
Scobell, John	5	0	0
Vigurs, John	5	0	0
Willan, L. R., M.D	1	1	0

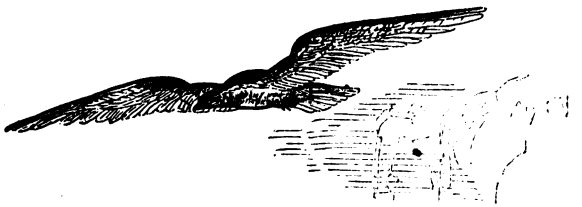
DONATIONS TO THE MUSEUM.

DONORS.	*SPECIMENS.*
Mrs. G. D. John.....	A case of foreign birds consisting of sand grouse, grakles, king-fishers, tanagers, humming-birds, &c., and two beetles. 23 *specimens.*
William Bolitho, Esq.....	A white-fronted goose.
John Richards, Esq.....	A female kestrel.
John H. B. Gurney, Esq....	A case of British thrushes:— two blackbirds, one with white feathers in the wing, two song, redwing, fieldfare, missel, and ring ouzel. 8 *specimens.*
Edward Hearle Rodd, Esq...	White wild mallard, killed at Scilly, pochard, female tufted duck, female golden eye, water-rail, coot, bittern, land-rail, partridge and puffin. 10 *specimens.*
John N. R. Millett, Esq.....	Skins of two eagles, pelican, secretary. four kingfishers, four woodpeckers, two parroquets, two ring doves, two pigeons, two humming birds, two golden orioles, one wild duck, &c., from South Africa. 23 *specimens.*
Miss Longlands.....	Flying fish.

Donors continued.	*Specimens continued.*
James Pascoe, Esq.	Couch's Cornish Fauna. Half-a-crown of Charles, found at Trengwainton. Three cases: 1st. two stormy petrels. 2nd. two crossbills. 3rd. blackcap, whitethroat, sedge bird, red breast, willow wren, chiff-chaff, two fly catchers, gold-crested wren, and common wren. 16 *specimens.*
Mrs. T. S. Bolitho	A pilchard of the unusual weight of 9½ ounces, 12¾ inches in length, and 6 inches in girt, caught at St. Ives, Nov. 1839.
John Batten, Esq.	A Snowy Owl, from North America.
Mrs. Ellis	A case containing a fox and duck. 2 *specimens.*
C. J. W. Ellis, Esq., M.A., &c.	A case containing a Scotch terrier.
Captain Cary, R.N.	The kissal, from Kissalia, central America.
Richard Moyle, Esq.	Alligator, scorpion, and beetle. 3 *specimens.*
Mr. Edward Chirgwin	Two specimens of the pipe-fish, sockets of the eyes of the sword fish, backbones of the Beaumaris shark and of the common shark, branchiostegous rays of the angler-fish, teeth of the basking shark, a stone shot from the ancient vessel lately found imbedded in the sand near Newlyn. 9 *specimens.*
Miss Elizabeth Carne	Heron, guillemot, whimbrel, and jay. 4 *specimens.*
The Rev. Henry Batten	Sixpence of William III, found in ordinary circulation.
Mr. Barnard	Tusk of a hippopotamus.
Richard Thomas, Esq. C.E.	Lichens from Temple moor near Five-lanes. 2 *specimens.*

Donors continued.	*Specimens continued.*
John Paynter, Esq.	Lichens from Bosliven moor, St. Buryan.
The Rev. John Buller	Guinea and shilling of queen Anne, shilling of George I., ditto of Elizabeth, silver penny of William the conqueror, a stone celt found at Kelynack common in St. Just, remains of an ancient urn containing bones, and a stone (supposed to be a talisman,) both found in a barrow on Brane common, Sancreed, a hazel nut and remains of a tree, found in the peat bed at Bostraze moor, St. Just. 10 *specimens.*
Edward Leah, Esq.	Two black cockatoos, ornythorhyncus, and hair from the head of one of the aborigines of Peru, supposed to have been interred before the conquest by the Spaniards. 4 *specimens.*
Miss C. J. Woolridge.	A short-eared owl.
Mr. Edward Harvey.	A fitcher and rabbit. 2 *specimens.*
John Silvester, Esq.	A peacock.
W. J. Henwood, F.R.S., &c.	Northern diver, red-throated diver, and guillemot, all in winter plumage. 3 *specimens.*

PENZANCE: PRINTED BY E. PADDY, BOOKSELLER, ETC.



PENZANCE

Natural History

AND

Antiquarian

SOCIETY.

REPORT

FOR MDCCCXLV.

ESTABLISHED IN 1839.

Penzance:

PRINTED FOR THE SOCIETY,
BY F. T. VIBERT.

Resolved,—That the Report with Mr. Couch's Address, and the list of Papers read to the society during the past year, be printed under the superintendance of the secretaries, and circulated amongst the members.

DONATIONS TO THE MUSEUM FOR 1845.

DONORS.	SPECIMENS.
Mr Paul	Four coins from Pompeii.
Mr. Cunnack, *Helstone*	Six coins.
Mr. E. Chirgwin	A sponge from Mount's Bay, *H. Palmata.*
Mr. J. Steer, *St. Just*	Snake from the plains of Troy; tessalated pavement from Pompeii.
Mr. R. Martin	Four shells and three eggs from Ichaboe.
Rev. John Buller	A badly-struck shilling from the Mint; electrotypes of medals of Milton, Voltaire, and Henry IV. of France; copper, brass, and silver tokens and medals.
Mr. Tregiga	Two eggs and three copper coins.
Mr. Millett, *Hayle*	Long-eared bat.
Mr. R. Q. Couch	Nest and eggs of the fifteen-spined stickleback.
Mr. J. Rodda, *Perran*	One silver and two copper coins.
Mrs. Tremethick	A copper coin.
F. Grantham, Esq.	Two adult black-headed gulls; two young specimens, with two eggs.
J. Campbell, Esq.	Numerous corals, &c., from the Mauritius; ornaments of wearing apparel.
A. Smith, Esq.	Hoopoe.
Capt. N. Pentreath	A Chinese junk.
Mr. Thomas Dustow	Shells from the Isle of Man.
Mr. Willis	Deposit taken from the inside of a steam-boiler at Wheal Vor.
Purchased by the Society	Two specimens of the boar fish; stuffed specimen of a dolphin.

REPORT.

THE report of the proceedings of the society, since its last annual meeting, is more favourable than it has been for many previous years. During the last twelve months, the attendance of the members of the council has been more uniform than at any former period. This increased activity in attendance has also been characterised by increased energy in furthering the objects of the society. The donations to the museum have been numerous and valuable, they have however been chiefly foreign productions, rather than those of our own county: but yet the occurrence of rare objects of natural history in West Cornwall have been carefully noted and brought before the society from time to time; and, at the monthly meetings, several Papers on different branches of natural history have been read, and afterwards published in the "Zoologist," a London magazine of natural history.

The additions to the *mammalia* during the past year have been of the common species only, except a seal, killed near the Land's-end. This is marked in our museum as the common seal, *phoca vitulina*, though it seems to be the young of the grey seal, *phoca barbata*, a much rarer species. This cannot now be decided, as the bones of the head were unfortunately thrown away without being examined.

Of the *cetacea*, or whale tribe, the dolphins have alone been examined, and the four recognised as Cornish have been found within our district: viz.,—the grampus, *delphinus orca*; porpoise, *d. phocena*; dolphin, *d. delphis*; and the leading whale, *d. melas*: the porpoise and dolphin are in the museum. Several other kinds

of *cetacea* have been seen, but not having been secured, the species could not be discovered.

Among the rarer birds which have occurred during the past year we have to record seven hoopoes, four of which were killed in the isles of Scilly, and the rest in the district of the Land's-end: one of them, from Scilly, has been presented to the museum by A. Smith, Esq., Lord of the islands. The roller has been killed at St. Levan, and is now in the collection of Mr. Rodd. The little gull, *larus minutus*, has been killed at Sennen; and the lesser terns, near Marazion. But the rarest of all the birds which have occurred since our last annual meeting is the fire-crested regulus. This very rare bird was killed by Mr. Vingoe, during the cold weather in March, in the immediate neighbourhood of Penzance, and passed into the collection of Mr. Rodd. But though this bird is so rare that only a single instance of its being found in Britain was recorded previous to this time, yet two other specimens were found dead, in the same month, in the garden of M. Williams, Esq., of Trevince, near Falmouth. A notice of this capture was brought before the society by Mr. Rodd, and afterwards published in the "Zoologist."

Of the reptiles of the district, we shall be more particular in mentioning each species than we have thought it necessary to be with the birds. The first is that remarkable species, the leathery turtle, *sphargis coriacea*. This was first recognised as Cornish by Dr. Borlase: he mentions two having been caught in July, 1756, in the driving nets;—one, four leagues south of Pendennis castle, and the other off the Land's-end: the last weighed more than 6 cwt. A few years since, another was mentioned as having been caught in Falmouth harbour. This is the only *chelonian* reptile found on our shores. Of the *saurian* species, we have the sand lizard, *lacerta agilis*, a remarkably active and elegant species. This has been caught in the Minney fields near Penzance, on Paul hill, on the road to Mousehole, in Madron, and in Zennor, and will probably be found in many other localities. It lives in hedges, dried grass, and among stones: its colour is frequently very brilliant. There is another species of lizard, called the *l. agilis* by Jenyns, (the *zootoca vivipara* of Bell) which, though

described as the common lizard, is different from that to which we here refer, and if found in the district, it has as yet eluded our researches. The slow worm, *anguis fragilis*, is common, and occurs in a great many localities around Penzance. In habit it is very quiet: it is in fact the most inactive of all the *anguidæ*. It is perfectly harmless, and rarely attempts to bite; and even if it did, its teeth are so small that they could not pierce the skin; and there are no poison fangs, so that it is an error to suppose it venomous. It is a very timid species; if disturbed or handled, it becomes stiff and readily breaks in pieces: the lost portions, however, are slowly renewed, in the manner described in a Paper read before the society during the past year. The next species which comes under our notice as being found in the district is the ringed snake, *natrix torquata:* this, from its great resemblance to the common viper, is dreaded for its poisonous bite, but it is however quite harmless, and it is to be regretted that so brilliant and beautiful a species should suffer an exterminating persecution from its resemblance to the poisonous adder. It has been found at Rosevean, and is sometimes of large size: it is rare. The common viper is the only poisonous species found in England. It is not uncommon in the fields leading from Penzance to the ponds at Trengwainton, in Madron, and on the hills round Mousehole. This, though an elegantly mottled species, yet has a sullen and virulent appearance about the head. It is very readily recognised from the last-mentioned species by having an inverted V behind the eyes. Besides the common form, we have the brown variety described by Bell, which by some is considered a distinct species.

Of the *amphibia*, we need scarcely mention the frog and toad, which are common in most situations. It is perhaps worthy of remark that their spawn occurred during the last winter so early as the middle of December, and in January, the adults were caught in the pools near Trengwainton. This is contrary to the opinions of most authorities. Bell says, they retire on the approach of winter to their hibernating retreats, where they pass that dreary season in a state of absolute torpidity. This early appearance of their spawn is not a singular case, for we have invariably noticed it in December since 1832; so that this seems to be the natural

period of their appearance, and not an exception to the rule. The frog, according to Rösel, deposits its eggs at the surface of the water; but this Bell says is a mistake, and that the eggs being found at the surface arises from the disengagement of gas in the substance of their glairy envelope, in consequence of partial decomposition. This however is incorrect; for, after examining a very great number of clumps of eggs, we have *invariably* found them resting either on the ground, or on the weeds: their being at the surface, or exposed to the air, arises from the evaporation of the water, or other causes of a similar tendency. On two occasions we kept the eggs till they became very much decomposed, and the envelope filled with gas, but their specific gravity was, in each case, too great to allow their rising to the surface. The next and last species found in this neighbourhood is the water newt, *lissotriton punctatus*, which is found in wells and clear pools.

Of the fish, we need not mention the more common kinds, as they are very well known. We have to record, however, the reappearance of the boar fish from the same locality in which it was caught last year. This was formerly deemed a very rare fish, but may now be considered common in summer in the western part of our bay. At our last monthly meeting Mr. Chirgwin mentioned the re-appearance of the torpedo, which was caught in a net in Gwavas lake: no description was taken of it, but it was the same species as the one preserved in the museum.

Our knowledge of the *mollusks* of this part of the county is but limited, and we shall therefore merely notice a few of the rarest. Dead specimens of the money cowry, *cypræa moneta*, which is among the rarest of the sea shells, are occasionally picked up near Sennen. The occurrence of this as a Cornish species is still considered doubtful by London naturalists, but that it has been found, both in a living and a dead state, on our shores, is beyond a doubt. A specimen of the *conovolus denticulatus* has also occurred near Sennen: as this was a dead specimen, it might have got there by accident, but we have seen it included in a list of fresh water shells, as well as the *bidentatus*, as being found at Porthcurno cove. Of the naked *mollusks*, we have found *aplysia depilans*,

a. viridis, doris argo, d. verrucosa, eolus papillosa, and a few others; but this department has not been carefully examined.

We hope at some future time to be able to present a report of the insects found in the district.

As the pursuit of natural history among the members of this society can only be a relaxation from other occupations, a great deal still requires to be done. But we hope that, during the next year, we shall have other labourers among us, who, by taking particular departments, will assist to make the whole more complete. To render this as practicable as possible, we would suggest that some alterations should be made in the monthly meetings, so that all the members may be enabled to attend when Papers are read.

In the antiquarian department of our society no communication has been received; though several coins have been added to our collection.

The society having somewhat revived from the torpor which has for some time hung over it, the council hopes that its increased energy will be continued without further interruption.

L. R. Willan,
E. H. Rodd,
R. Q. Couch,
J. N. R. Millett,
} *Secretaries and Curators.*

Sept. 12th, 1845.

An Introductory Address on the study of Natural History,

DELIVERED BEFORE THE SOCIETY AT ITS ANNUAL MEETING,

BY MR. RICHARD Q. COUCH,

ONE OF THE SECRETARIES.

THE study of natural history, considered as a branch of natural philosophy, is of very ancient date. The Greek and Roman philosophers viewed it in connection with medicine, astronomy, agriculture, and the other departments of knowledge, which are now established as independent sciences. But, even at a later date, natural history included comparative anatomy and physiology; which cannot, I think, even now be separated from it. Natural history, as at present understood, embraces a description of the outward forms and habits of all organized beings: and, in this character, it is my intention to bring it before the society to-day. But, though natural history is thus separated from anatomy and physiology, yet there is, in a state of nature, an inseparable union between them. They are regulated by the same laws, and together produce an unity of result. From the time of Aristotle to Linnæus, and even down to Cuvier, the systems, in which the productions of Nature have been arranged, are purely artificial, and as absurd as those formerly prevalent in astronomy. While almost all other kinds of natural knowledge have been placed on a firm basis, and erected into sciences, natural history has, till very lately, existed only as a mass of facts, without order or design, regulated by no laws but those which systematists have chosen to impose.

The first effort of importance, to effect an arrangement among the productions of Nature, was made by Linnæus: but his method

was, confessedly, artificial, and designed only as an assistance to discover the natural laws. Since that time, the pupils of this great man have considerably expanded the views of their master; while Cuvier, and our distinguished countryman Mac Ley, have so far extended the pursuit, that it may now fairly be considered as one of the inductive sciences. It being impossible, in an address like the present, to take a survey of the whole subject, it has been thought best to give an outline of some of the laws which are connected with developement and form; and to present a general summary of natural history as it at present exists.

It is not to be expected that natural history, like astronomy, would supply us with lofty conceptions of infinity of power and immensity of space; but it, certainly, affords equal proofs of profundity of design, and illustrates more than any other science the kind superintendence of Providence for the preservation of her creatures.

The various departments of the animal-creation, however diversified, possess an intimate dependance on one another; so that the destruction of one would, in some degree, affect the well-being of the rest. This fact is not always apparent; but, in many instances, it is so obvious, that it cannot escape the attention of the most incurious observer. It is by this means that Nature maintains a due proportion among her productions. Thus, in warm climates, if animal substances be exposed to the influence of the sun but for a few hours, decomposition rapidly ensues, and spreads its pestilential influence over all the surrounding districts. In such situations insects abound; their eggs are deposited in the decaying matter, and, by the heat of the sun, are stimulated rapidly into life, in the form of the larva or maggot. These, by their united labour, quickly remove the deleterious substances, and relieve the neighbourhood from a pest. Such a profuse production of larvæ, however, would, in its turn, become injurious, from the vast number of insects that would be produced in the following year; these, therefore, are devoured by the insectiverous birds which abound in tropical climes; while the latter are thinned during their migrations, by the larger birds of prey. Thus, we perceive that one is kept in check by the other, and that a greatly diminished

number, in one class, would give rise to an increase in another. But, as every creature is liable to be preyed on by others, so it is furnished with weapons for repelling those which are most liable to attack it. Those which are the most powerful and predaceous, and consequently the least liable to be assaulted, are the fewest, and have the smallest number at a birth; while the least powerful are the most numerously produced. By these, and similar contrivances, Nature preserves every class within due bounds, and provides for the harmony of the whole.

In the study of natural history, however, we cannot follow, so closely, the methods of induction, experiment, and mathematical reasoning, as in other departments of science; since the productions of Nature are characterized by an almost boundless diversity of form, and the regulation of their developement is entirely beyond our controul. We are, therefore, compelled to be little more than mere watchers of the complex phenomena presented to our view; but, having observed them, they are as capable of being reduced to order as the facts of any other science. But, to be a successful and philosophic naturalist, requires a rare combination of qualifications:—great industry in collecting facts must be united to a ready discernment of the nature of things, and a quick perception of the laws by which they are regulated: and the person who is contented with a mere collection of facts, or materials, of natural history, is no more than a mechanical labourer in the field. To arrange these materials, to watch their order of succession, and the phenomena connected with them, and, thereby, to discover their laws of developement, is, or ought to be, the principal object of pursuit. But, to do this with success, requires, perhaps, as vigorous and as chaste an imagination as any poet could possess. This will apply to discoveries in all sciences: for what, but an almost superhuman imagination, enabled Newton to obtain the first glimpses of the laws of gravitation, and, afterwards, the almost miraculous extention of them in the way he did? and what, but the bringing of his conceptions to the test of facts, by laborious observation, enabled him to attain such a prominent and dignified station in the world of science? Linnæus was remarkable for the energy of his imagination, as well as for the strict command which he

exercised over it, in writing his *Systema Naturæ*. And that surprisingly-beautiful law, observed in botany, that all parts of a plant are but modifications of a single organ—the leaf—was the discovery of one of the most imaginative of modern poets, Goëthé. This celebrated man published his "Metamorphoses of Plants" in 1790. It is true, that this doctrine was obscurely hinted at by Linnæus, by Woolf, and by others; but, not till the time of the poet did it assume a definite and tangible form. He taught that all flowers and fruits are but altered leaves;—that the spears of the thorn and the pear are but stunted branches;—that the double flowers of the florists are the result, not of accident, but, of a definite law; and, like most other discoverers in science, was laughed at for his reward. It was supposed, from his being a poet, that this theory could be nothing but a freak of his fancy: subsequent information, however, has shown that, instead of being a mere fortunate speculation, it was the result of careful induction on an imaginative mind. I may remind you that Goëthé was a laborious botanist during a great portion of his life.

The singularly-interesting and now firmly-established law, to which I have just referred, has been severely tested throughout the whole range of botany. A principle, once discovered, may be easily extended from one object, to a similar one under different circumstances; and thus, during the past year, this law has been used to explain some remarkable deformities in the arborescent and lower grades of animal life; and the process by which Nature effects the transmutation of one organ into another. Of the success of this extention of the law I need not now speak, since it is still undergoing the test of experience; but I may observe that, so far as the examination has been carried, it has been found to be correct. Thus, then, an extention of the laws of (what is termed) morphology takes place, pervading the vegetable and the animal kingdoms. There is not only an interchange of the law of developement between the two departments of Nature, but there is also a mutual fluctuation of character in almost every particular; hence, there is no line of demarcation between the animal and vegetable kingdoms, as common language would lead us to suppose.

Many of our most eminent natural philosophers have attempted to define an animal, so as to distinguish it from a vegetable; but this they have always failed in doing. Linnæus concisely drew a distinction, in his celebrated axiom, that "stones grow, vegetables grow and live, animals grow, live, and feel." Thus, you perceive, he made sensation an indispensable requisite to animal existence: but it has been inferred, from repeated observations, that some sponges are decidedly animal, and yet they have never betrayed signs of sensation, although injuries of the most severe kind have been inflicted on them. The sensitive plant, on the other hand, though decidedly vegetable, exhibits such symptoms of perception, as to set the rule of Linnæus at defiance. The most satisfactory definition yet given, perhaps, is that a vegetable is either fixed by a root, or perpetually immersed in a fluid from which it derives its nourishment; and that it absorbs nutriment with the whole of its surface—as is the case with sea-weed: whereas, animals are generally capable of changing their position; or, if rooted, they always possess a stomach, or interval cavity, for the reception and digestion of food. This definition, comprehensive as it is, excludes many things undoubtedly animal, and cannot, therefore, be allowed to be decisive. Sponges have always occupied debateable ground between the two kingdoms. Linnæus altered his opinion respecting them several times: Lamouroux, Johnston, Owen, and Ehrenberg think, or rather thought, that they were vegetable: Pallas, Fleming, Grey, and Jones consider them as the lowest form of animal existence. For my own part, I look on them as fluctuating on a line between the two kingdoms: for, while some are apparently vegetable, others are decidedly animal. In the course of my examinations of the animal-creation, proceeding from the more, to the less, perfect forms, I arrived at the conclusion that there is no distinction between the two kingdoms; but that one flows imperceptibly into the other, the form and physiology of one gradually taking the place of the other. This opinion I mentioned to that distinguished botanist Mr. Ralfs, and he told me that in the course of investigations, proceeding from the *less*, to the *more, perfect* productions of Nature, he had arrived at the same conclusion; and, thus, we met on the same ground,

though by different routes. The German botanist, Dr. Kutsing, appears to be of the same opinion. However widely separated, therefore, the elephant may be from the moss, yet the confines of the two classes are indefinitely blended with each other.

The numerical extent of the animal kingdom, even, as at present, imperfectly examined, is immense. Thus we have upwards of 100,000 insects already known and described; while others are daily being discovered. Of the *monads* it is impossible to imagine the extent. It has been estimated that 500,000,000 have been discovered in one drop of water of the size of a cubic line; and yet, immense as this number is, all had sufficient space for free and vigorous action! Wherever animal-life can be supported it is produced, and that, frequently, in forms most ludicrously grotesque; as if Nature, usually economical in her work, were lavish and sportive here to show the fertility of her resources.

I cannot, on this occasion, notice even one half of the interesting productions of our own county. However, among the more beautiful and graceful of the natives of Cornwall, the *zoophytes*, undoubtedly, hold a high rank. Some are gracefully arborescent and feathery; others, less elegant in form, are more brilliant in colour. The sea-anemones of our own bay are frequently gorgeous in appearance. The arms which, in great numbers, surround the mouth of this animal, are variously marked with brown, red, green, yellow, and white; and these are arranged in such a manner, that each forms a circle round the central mouth: the effect of the whole is so beautiful, that it rivals even the colouring of flowers. The vast stores, however, of the animal kingdom, forbids any lengthened notice of creatures so low in the scale of organization: turn where you will, to the stagnant pools or the solid rocks, new and unexpected forms will constantly present themselves to view.

The variety of forms and conditions, to which animals are subjected, are very great; some, as sponges and *zoophytes*, are rooted and arborescent; others, as the *medusæ*, are gelatinous, and driven about by the winds and waves; and the star-fish, at first rooted, are afterwards free. In the higher grades, the creatures differ much among themselves, but are endowed with sensation and locomotion; and thus they rise, by gradation, to the perfection of all in man.

In the higher animals, we observe that the great diversity of action which exists is affected by muscles acting on solid fulcra; while, in the lower animals, composed of gelatinous or other soft textures, we find that similar motions are equally well performed, without a single solid point on which to act. This is produced by means as simple as they are efficient, and we can scarcely be otherwise than affected with surprise and admiration at the wonderful resources of Nature in overcoming difficulties apparently insurmountable. When the *actinea* are about to move, they swallow a large quantity of water, and as all the orifices through which it could escape are guarded by circular muscles, the pressure of these muscules on the contained water, converts it, in reality, into a fixed central fulcrum, on which every motion is produced; and being fluid, it can be shifted agreeably with the wants of the animal. This mode of compensating for the absence of solid points is extensively diffused among the lower animals; though it exists in a rudimentary state, only, among the higher.

But, while we contemplate the great and inexhaustible resources of Nature for accomplishing her designs, we cannot but be struck at the wonderful economy she employs, in making them subservient to different purposes. This water, which supplies a fulcrum for muscular action, is used, also, for respiration, and the perfecting of the young, and to each it is equally indispensable. There is so much uniformity, though on some occasions apparent contrariety in the structure and habits of living nature, that most, or, rather, all naturalists are fully convinced that there must be a particular plan on which the whole has been formed: hence have arisen the numerous systems of arrangement which are now extant. That of Linnæus was, confessedly, artificial, and intended as a means of discovering the order of Nature. That of Cuvier has been called the "Natural System," but it is, in reality, as artificial as any other, although it, certainly, takes the spirit of Nature for a guide. These *inventions*, though they have greatly assisted us in the discovery of species and intimate relations, and have formed convenient methods of arranging our knowledge, yet they have retarded us in our advance towards the discovery of the true system. Thus, the ancient theories of astronomy, although they

served as a guide to some of the celestial phenomena, yet diverted the attention of men from the contemplation of those facts which afterwards gave rise to the discoveries of La Place and Newton.

The systems of Linnæus, Cuvier, and the others, are, if I may so term them, linear, consisting of a single series of links: but it has always been found, after advancing a short distance, that additions were necessary, which would break the uniformity of the series. This difficulty was avoided, in a considerable degree, by our distinguished countryman, Mac Ley, who laid the foundation of a better system. Whether this system be correct, or not, in every particular, remains to be decided; but it, certainly, has the recommendation of having discovered many of the deficiencies which extinct species supply, though many vacancies yet remain.

The first law of Mac Ley's system, to which I shall refer, is, that the order or succession of every series of beings is circular; so that, strictly speaking, there is neither a definite beginning, nor end, the two extremes blending so imperceptibly, that, when united, no distinction of parts can be perceived. Hence, the objection to the linear arrangement, arising from a displacement of some allied species, is obviated. To render the idea of this circular arrangement as clear as possible, I will refer you to the circle of the months, supposing every month to represent an animal. February, in this case, would bear a close resemblance both to January and March; March to February and April; and thus, advancing, we should find at last that the character of November and December would resemble that of January; and, if the old system of arrangement had been followed, an attempt would have been made to have inserted November and December after January; and thus inextricable confusion would have been produced. In the present system this is obviated, for the character of January, after advancing to June, again returns into itself through November and December. In this illustration, we perceive that, however different January and July may be, yet, in reality, they are but opposite parts of the same circle. This system is not a fanciful, or visionary structure, for it is founded on the principles of reason, and built with materials obtained by laborious research: it has,

however, been carried to most romantic and injurious lengths by Mr. Swainson, in the Cabinet Cyclopœdia. This law of Mac Ley has been called the "circle of relationship," because, for example, the hawks are circularly related to the eagle; and the leopards and cats to the lion.

There is, it is said, another law, the law of analogy, by which the productions of Nature are formed into great divisions, such as beasts, birds, and fishes; and that, in each, there are circles, corresponding to other circles in each division, which embrace animals of similar habits. As an example will illustrate this better than any verbal description, I will remind you that, among beasts, the leopard and the tiger are connected, by affinity, with the lion; among birds, as I have before observed, the hawks are united with the eagle; and, among the aquatic tribes, the sharks with the dog-fish. But the circle of analogy supposes that the lion, among quadrupeds, is represented by the eagle among birds; and by the shark among fishes; each being the lord and tyrant of its respective class. This seems to be fanciful; though supported by a great accumulation of facts. From this it would appear that groups, corresponding in some degree with one another, are to be found in every class; but they cannot be termed parallel groups, inasmuch as it is evident, that in ascending in the scale, there is a great tendency to converge to a point. This law, however, is not yet established; its advocates and opponents being equally warm in defending, and opposing it.

If the law of analogy be correct, the marsupial quadrupeds, which carry their young in external pouches, ought to have representatives among fishes and birds; and strange as it may appear, several marsupial fishes have been discovered in Mount's Bay, and I have had frequent opportunities of examining them alive. Whether birds of such a character will ever be discovered, no one would venture to predict; and yet if the law be correct such undoubtedly ought to be the case.

There is another law, of equal importance with any that have been mentioned before; and may, in fact, be considered the foundation of all the others; it is, that many animals, in their earliest stages of growth, pass through the permanent forms of those

immediately below them;* hence, it is necessary to examine many creatures in their earlier stages of developement, in order to determine the rank which they occupy in the natural scale. But the adult forms of animals flow imperceptibly into one another. This law, however, requires considerable analytical powers to make it apparent in many of the classes—to extract, as it were, the fact, surrounded as it frequently is by others, which have taken a local standing of more importance. In some instances, where it is greatly developed, it is apparent even to casual observers: as, for example, with the frog. Every one is aware that this animal, in its early state, is a fish; but it undergoes a series of well-marked metamorphoses, and then assumes the form of a reptile. In others of the same class, however, the change is not so distinct; the generic characters are brought closer together, and the intermediate steps of developement appear to be suspended, or, rather, reduced to their lowest state of change. And yet, if minutely examined, the rudiments of the law will be discovered. As the frog passes through the fish-form in arriving at its adult state, the fish is placed immediately below it in the scale; but, still, there is a gradation—a passing from the one to the other. If the naturalist advance, from any race of animals, to that which lies beyond it, he will find himself led by such simple gradations, that the transition will be imperceptible. *Nihil per saltum* is one of the most constant laws in nature; and, of this, we had, some years since, a very remarkable example in the *lepidosiren*. Of this very remarkable animal, two species have been discovered; one by Dr. Natterer, in the river Amazon; and the other by Mr. Weir, in the Gambia. It has been very doubtful whether it should be considered a fish or a reptile. Professor Owen, after a minute dissection, thought, notwithstanding it possessed lungs, that it should be called a fish, because the *ichthyological* character pre-

* In stating that some creatures in arriving at maturity pass through the permanent form of animals immediately below them, it may be necessary to observe, in opposition to a fashionable work, that the creature undergoing the metamorphosis is not *specifically* like any other. Taking the frog as the instance; in its young state it is a fish, but is yet not like any other fish, any more than a *cod* is like a *whiting*. It is fish in character only, or in other words it breathes by gills and swims by fins. It appears to be a want of appreciating this distinction that has given rise to many of the plausible absurdities found in the "Vestiges of the Natural History of Creation."

vailed: but the balance appears to have been decided by the fact that the nostrils are blind sacs, instead of being open to the throat. This character is peculiar to fishes. Dr. Naterrer considers it amphibious; and this opinion has been (since the Professor's dissection) in some measure confirmed, two specimens having been brought to this country in a state of hibernation. But, if either opinion be correct, it would show the beautiful gradation in which two classes, so dissimilar in their extremes, imperceptibly blend with each other.

In every department of natural history, similar characters are discernable; grace and beauty are every where apparent; there are no abrupt terminations to any class; but one vanishes, if I may so express it, into another. What can be more characteristic of a bird than wings?—yet, we find birds without them, and bats possess them! What can be more characteristic of a fish than fins, and an aquatic life?—yet, there are creatures with these, that breathe air and suckle their young!

Animals, in the lower grades, are very numerous; but they become less so, and more concentrated, as they rise in the scale of being. So that Nature may be viewed as a vast cone; having, for its base, inorganic matter, and, for its apex, man. But, although man is placed at the head of the terrestrial creation, yet there is a considerable difference of character between him, and those creatures in the next station below. Still, the lines of affinity are so distinctly marked that they cannot be mistaken.

From what I have said, it will be evident that natural history, as well as the other sciences, is inductive; although it has not yet been reduced to a perfect form. In referring you to a few of the discovered laws, I have confined my attention to the external peculiarities of such creatures as are well known; but the same kind of gradation and regulation governs every organ in the animal structure.

There are many great chasms among the living races of creatures which divide Nature into irregular masses; and it is, in reality, a great achievment to have discovered that these vacancies exist. We turn now to the geologist, to bring forth his petrified creations, and supply the defects. So constant is the analogical character,

of even the most trifling particular, that, by the inspection of a tooth, we can determine the kind of animal to which it belonged; and since the time of the illustrious Cuvier, this has been a comparatively easy task. It may, in fact, be reduced to a mathematical form—a tooth, or bone, being given to determine the kind of animal to which it belonged. Even the hair, hoofs, and marks, as well as the forms of creatures, are closely related to one another. I may add, that the spots of the leopard and the tiger are not indiscriminately distributed; and those which seem to have little congruity of appearance, are united by intermediate forms. The marks of the hawks, sharks, &c., are regulated by the same law. The stripes of the zebra become fainter in the quagga, and are nearly lost in the common ass. Thus, we perceive that the most trivial circumstances are governed, not by accident, but by laws, and the more we examine the more clearly will this appear. To what our investigation may ultimately lead we know not, but judging from the past, we may look forth to more clear developements of wisdom and design.

On the Morphology of the different Organs of Zoophytes.

By R. Q. COUCH, M.R.C.S.L.

[With a Plate.]

THE subject which I have to bring under the notice of the society to day is, if it proves true, one of great beauty and unusual interest, inasmuch as the lowest forms of animal life will, in the developement, be found to be governed by the same laws which regulate the growth of flowering plants. The vegetable law to which I refer is the metamorphosis of the leaf into the various organs which constitute the perfect plant. This law is now so well established, and so generally allowed, that nothing is required to be said of it; on the present occasion I shall therefore proceed to discuss its application to the animal kingdom. To Professor E. Forbes belongs the merit of first promulgating the theory of the morphology of the reproductive system of the *Sertularian zoophytes*, and its analogy with the reproductive organs of flowering plants: this he did at the late meeting of the British Association held at York.* It is an opinion I have long entertained, and in elucidation of which I have for some time been examining almost all the species found on our shores. The views were so new that I hesitated to adopt them, and had I not found that they were held and published by others, I should not now have brought them before this meeting. I do so to show how far the theory of Professor E. Forbes is supported by inductive observations; and that, though we pursued in a great measure different paths, we yet arrived at similar conclusions. As

* As reported in the Athenæum. The entire Paper, illustrated by a plate, was inserted in the Annals of Natural History, for December, 1844.

Professor Forbes confined his observations to the genera *sertularia* and *plumularia*, they are the ones which will be referred to here, though the same observations may be extended to several genera of the *Ascidian zoophytes*; *crisia* and *cellularia* for instance. In making these observations I shall refer to their growth *ab ovo*, and trace the different parts through their developement to the fully formed character. These creatures resemble plants in their arborescent appearance, rooted character, and the transient nature of their reproductive organs. The *Sertularian* genera have an external horny, elastic and irritable sheath, and this incloses a central granular pulp, which extends into all the ramifications, and from which all the other parts are formed. On the branches are numerous variously-shaped and differently-arranged cup-like cells; but their arrangement and shape are always alike in the same, though they differ in each species. These are the polype cells, in which the polypes or prehensile portions are situated. The polypes are attached inferiorly to the central granular pulp which ramifies through the centre of the trunk and branches, and are indeed formed of it. The head and arms are the only portions of the creatures exposed to the influence of the surrounding water, and by these the food is taken, digested, and the nourishment distributed to all the other parts. In many species the polypes are exceedingly numerous; but though they are entirely independent of each other, as regards their individual life and nourishment, yet they cannot be considered as distinct animals; for the whole production seems to be but one compound creature, derived from the same source, the pulp, and all tending to carry out the same object. In this respect they resemble trees; each branch is independent of all the others, and may be cut off without injury to the whole, and yet, all together, they constitute the perfect polypidom. At particular seasons, extending from the middle of summer to autumn, and, in fine weather, to the early parts of winter, there are other and differently-shaped cells developed, which are larger than those previously mentioned as containing the polypes; these are the ovigerous vesicles, which, after having performed their function, drop off and disappear. In this they differ from most other animals, in which the reproductive organs are, in duration, co-extended with the lives of the creatures,

and offer a remarkable analogy to similar parts in plants, both in their decay and periodical re-appearance. "These organs," Professor Forbes says, "in their nature, have often been discussed but never explained." By their nature the Professor cannot mean the function they perform in the œconomy of the creature's existence, since that is established by numerous and accurate observations; but rather, I presume, the *nature of the type* from which they have undergone their *ideal* metamorphosis. In this he is certainly correct, and the present observations are intended to elucidate and in some measure to extend it. The reproductive gemmules are very minute globular bodies, surrounded by numerous vibratory cilia which are in constant action. The mode in which they are formed will be briefly described hereafter. As soon as they have escaped from the ovigerous capsule into the surrounding water, they move about with great rapidity in a revolving manner, like the earth on its axis. While examining them in a bottle I could perceive that they occasionally stopped, and then again would rapidly move from spot to spot. In this way they move about from one hour to nearly two days, depending apparently on the temperature and the nature of the surrounding surfaces. They would occasionally rest on the glass for a few minutes, and then, as if the spot was an unfavourable one, would again start off and revolve as rapidly as before, frequently changing their form from the circular to the oval; sometimes acquiring an hour-glass contraction, and at others assuming the appearance of having an enlarged head and a narrow and contracted tail. But, having once fixed itself, it remains rooted ever after. From the period it first becomes stationary, it speedily undergoes a change in tint, but this, however, would hardly be perceptible, except to a practised eye. When this has taken place small fibres are given out from the base, or all that portion in contact with the glass; these constitute the roots by which the creature becomes fixed. From this point it quickly rises into the arborescent form of the adult. This is a remarkable change; for here we see a creature, in its youngest form, moving about with almost the irregularity of voluntary motion, yet in a short time becoming rooted, and taking on so much of the vegetable form and appearance, as to have required, at the hand of Ellis, repeated

observations and accurate demonstrations to persuade us to the contrary. The seed being fixed, the upper portion becomes elongated without any distinction of parts, and the first joint of the creature is formed. Taking the sea-thread, *laomedea geniculata*, as an example best calculated to show the analogies between the formation of the polype cells and ovarian vesicles, the central pulp of the seed becomes the central granular pulp of the adult. After the *ovule* has become superiorly elongated to a distance equal to the usual length of the cell and its footstalk, it enlarges and becomes bulbous. All is now one undefined mass; but in the course of a few hours the stalk becomes shrivelled, and the bulbous termination acquires a deeper tint towards the centre, and lighter towards the circumference. At first this central shade is slight and indistinct, but it soon becomes darker and more defined. As this condensation or organization advances, the pulp becomes more transparent at its circumference, and darker towards the centre. At this stage the transparent circumference appears to be drawn into transverse folds, as if from a force acting towards the centre, and leaves behind a transparent horny covering which eventually forms the walls of the future cell. In this way the whole of the pulp becomes separated from the investing sheath. This being effected, the upper edge of the bulbous portion of the pulp acquires a serrated edge, which in a short time becomes more and more distinct and enlarged, and, finally, is produced into finger-like prolongations, forming the tentacula of the polype. It is by an extension of developement that the horny cell is opened, and not by any mechanical pressure as has been supposed, since the only source of pressure is from the polype, and that is not in contact with it at the time. In this the polypes are formed from the central granular pulp in all the *Sertularian* species, having but very slight modifications in the different genera. The prolongation of the stem is formed in precisely the same manner, but without a bulbous termination. The granular matter or pulp, which is at first diffused, becomes condensed or organized towards the centre, leaving the investing sheath in its annular form, and no further developement goes on. It is this cessation of growth, for the purposes of organization, that regulates the length of the internodes,

both of the trunk and branches. Hence also arise many of the irregularities so frequently observed. If growing in a variable situation, some of the internodes are short, while others are nearly double the usual length, depending on the vigour with which each portion is developed. These variations are more observable in *sert. pumila* than in the sea-thread, *laomedea.*

The formation of the ovarian vesicle, in this genus at least, occurs in a very similar manner to what has been described in the polype cell and trunk. The ovarian vesicles are cells formed during the summer and autumn, in situations varying with the different species; and these, having performed their function of reproduction, are periodically shed, to be replaced by others at some future time. Their first appearance are small protuberances or elongations of the part on which they rest. At first a darker appearance of the pulp and sheath is observed on the part in which the vesicle is about to be produced. This is prolonged precisely in the manner noticed in the formation of the polype cell and trunk, and the separation of the pulp from the sheath occurs also in the same manner. It increases in length to the usual extent of the vesicle, and, with the exception that its transverse axis is larger, resembles a branch in everything. But, instead of being produced into a polype, as in the polype cell, the surface becomes marked with circular lines, which, as developement goes on, assumes the form of small grains or globules, more or less embossed, according to the stage of advancement, They rapidly become more and more defined and separated from each other, but remain attached to the central pulp by an umbilical cord. This also becomes more attenuated, and finally gives way, and the gemmule remains free in the horny case. These gemmules have a central granular pulp, surrounded by a semi-translucent zone or case, and have their surfaces covered, from a very early stage of their formation, with numerous vibratory cilia. In this free state they remain in the case for a short time; for the upper portion of the vesicle opens, and the remarkably active gemmules revolve rapidly from spot to spot, as has been previously described. From this, it will be perceived that the function of these periodic vesicles is reproduction; and, therefore, when Professor Forbes says that their nature is unknown, he can

mean only the *ideal* form, from which he supposes them changed during their developement.

From the foregoing observations it will appear, that in the earliest stages of growth, the stem, the polype cells, and the ovarian vesicles of the sea-threads, *laomedea*, are precisely alike, and that, at a particular point of their developement, each assumes its individual character. The stem advances to one point and is there arrested in its organization; the polype cell advances to the same point, but, instead of being arrested, the pulp becomes developed into a polype and the sheath into a cell. This, however, seems to be only the case when the termination is bulbous; for, in many instances, I have seen that where the pulp was not bulbous, but of the same diameter throughout, and about the size of the stem, that no polype has been developed, but merely a distorted branch. Where specimens grow in unfavourable situations, such distortions are not unfrequently to be found; and most of them I believe are attributable to this cause. This malformation is most frequently to be seen in *sert. polyzonias*, *rosacea*, and a few other kindred species.

The ovarian vesicle also advances as the branch and cell, but instead of being of equal diameter throughout, as the former, or bulbous at its extremity, as the latter, it is enlarged or bulbous throughout its extent, and is united to the branch or trunk by a narrow and short peduncle. Instead of the vescicle being arrested in its growth at the same point as the stalk, or organized into a polype as in the cell, it becomes developed into numerous minute globes covered with vibratory cilia as previously mentioned. Here then we see a great similarity between the different organs of these creatures,—a similarity so great as to warrant the supposition of their primary identity and subsequent individualization, even if there were no others. In *sertularia polyzonias* I have several times seen a polype cell terminate in a distorted branch; and on the other side I have seen a branch terminate in a polype cell, showing a convertibility into each other.

In all my examinations I have never seen the ovarian vescicle occupied by a polype. Ellis, however, has figured something like this with the polype protruding, but he says nothing of the kind in

his text, and I am unacquainted with any one who has witnessed anything of the sort, though observers have become numerous since Dr. Johnston's work has been published. I have however seen a cell, apparently designed for a vesicle, small in its growth and occupied by a polype. This form of vesicle has been selected for my illustration, because, if I understand Professor Forbes, it is the one about which he had doubts. At some future time, when I have a little more leisure, I should like to offer a few observations on others and diversified forms of these transitory cells.

EXPLANATION OF PLATE. (*B.*)

Fig. 1. Earliest state of branch.
Fig. 2. Second stage of branch.
Fig. 3. Third stage of branch.
Fig. 4. First stage of the polype.
Fig 5. Second stage of the polype.
Fig. 6. Third stage of the polype.
Fig. 7. First stage of the ovarian vesicle.
Fig. 8. Second stage of the vesicle.
Fig. 9. Perfect form of the vesicle.
Fig. 10. A branch and an ovarian vesicle of *sert. polyzonias* converted into cells.
Fig. 11. A cell of *sert. polyzonias* converted into an imperfect branch.

Notice of the capture of the Fire-crested Regulus.

By E. HEARLE RODD, Esq.,

ONE OF THE SECRETARIES.

DURING the inclement weather which visited us in the early part of March last, several chiff chaffs *(sylvia hippolais)* were observed in a wet ditch, at Rose-vale, a few hundred yards from Penzance, a locality which perhaps offered as good a protection as any in the neighbourhood from the easterly winds then, and for some time previously, prevalent. Amongst these delicate birds was observed a bird presenting a greater proportion of sulphur-green on its upper plumage, a circumstance which subsequently led to its capture. This bird proved on examination to be the fire-crested regulus *(regulus ignicapillus)*, and one of great value, as not only a rare British species, but as afterwards proving to be the first *recorded* example of its appearance in Cornwall; whilst it will be only fair towards another locality, within twenty miles of this place, to admit that a short time previously, and during the visitation of the same severe weather, two other specimens of the same species were found dead, and in a state which happily admitted of their being preserved. This occurrence was not made known until after the Penzance specimen was publicly recorded as having been obtained.

The three bands, above, through, and under the eye, in the example now under notice, are sufficiently plain to be remarkable, without being very distinct, whilst the white immediately above the eye, and the yellow-green on the back, and on the shoulders especially, are very well developed. The above characters are the

distinguishing features of the species from its closely-allied congener, the well known *regulus auricapillus*. It appears that the fire-crested regulus was only first made known as an inhabitant of this country in August, 1832, when a specimen was rescued from destruction after being killed and brought into a house by a cat, from a garden at Swaffham, Bullbeck, near Cambridge. Others, since that period, have been *reported*, on good authority, to have been seen, but our county must bear the merit of authenticating the second capture of this interesting species, which was caught in the Penzance district.

On the Reproduction of amputated parts in the lower Animals.

By R. Q. COUCH, Esq., M.R.C.S.

THIS Paper contained the results of a series of experiments on the mode in which injured and amputated parts in the *Reptilia* and *Crustacea* are restored. If the arms, legs, or tail of the water triton were amputated, the wounds first healed, and then the lost portions were restored as perfect as the original members. The process was minutely described, as well as the conditions necessary for its completion, and those circumstances were alluded to, which either retarded or suspended the process. The loss and reproduction of the claws in crabs and lobsters were also briefly described. Then a comparison between the processes in the different creatures was instituted; from which it appeared, that the phenomena observed in reproducing the lost members were similar to those followed in their original formation. As this Paper is a long one, and one of a series, on the best mode of performing amputations, in reference to rapidity of healing, we therefore give merely an abstract of it.

Notice of the capture of the common Dolphin (Delphinus delphis) *on the Cornish coast.*

By R. Q. COUCH, Esq., M.R.C.S.

[Plate C.]

SINCE the last meeting of the society, a fine specimen of the common dolphin, *delphinus delphis*, has been caught at Hayle. It came in over the bar at high water, and remained till the return of the tide forced it to try to effect its escape. In this it could not, however, succeed, from the shallowness of the water. At this time it was seen by the fishermen, and other persons near the spot; and efforts were made to secure it. During the chase it became furious, and it was only by being tired that a wound could be inflicted on the posterior part of the body. From this flowed a large quantity of blood, the creature became exhausted, and was finally secured. It has been purchased, and is now deposited in our museum. In the stuffing the shape and colour have been very well retained. It is seven feet eight inches in length, and three feet ten inches in its greatest circumference. The body is slender, and gradually tapering towards the tail. The head is prolonged into a slender, slightly-compressed, cylindrical snout. At six inches from the termination of the snout the forehead suddenly rises, enlarges, and gently slopes posteriorly. The gape is eleven inches and three-quarters in length. The teeth are $\frac{50}{50}-\frac{50}{50}$, perfectly white, conical, and arching outwards. The dorsal fin is near the centre of the back, being three feet one inch from the tip of the snout, and three feet four inches and a half to the termination of the tail. It is eight and a half inches high, somewhat crescentic in shape, and slightly arching backwards. The

breathing-hole is nine inches and a half from the termination of the snout, and is small. The pectoral fin is one foot in length, rises one foot three inches from the snout, and is situated very low down. The tail is transverse, two feet long, crescentic, and notched at the centre of its posterior margin. The posterior part of the body is much compressed, and extends nearly to the notch on the posterior margin of the tail. In colour it bears but little resemblance to the splendid descriptions of the ancients. It is of a deep black, black-grey and ash tints fading to a white on the belly; and it was not more brilliant when first caught. About half an inch from the point of the snout is a white line, which runs parallel to the gape to near the eye, which is near and slightly above the angle of the mouth, there it rises and forms a narrow white circle round it. The pectoral fins are black, with a central white patch which extends anteriorly to the lower jaw. The posterior portion of the body is greyish, and mottled with black and white patches. It is a male specimen. This species has been noticed as occurring in Cornwall two or three times before, and Dr. Borlase, in his Natural History, gives a figure of one, but it is much too stout to be a portrait of the presect specimen. But the figures of other authors are far more characteristic, and hence there can be but little difficulty in identifying the present species. There is, however, one point in which a variation occurs from the printed descriptions. The teeth are said, by Professor Bell and Mr. Jenyns, to vary from $\frac{42}{42}$-$\frac{42}{42}$ to $\frac{47}{47}$-$\frac{47}{47}$, or from 168 to 188; but in the present case they are $\frac{50}{50}$-$\frac{50}{50}$, or 200. But it seems probable, that where the teeth are so numerous, and liable to vary from 42 to 47 on each side of the jaws, the increase of the number to 50, as in the present case, need not be considered of much importance.

This species is said *occasionally* to visit the British shores, but Mr. Chirgwin observes, and in this he is confirmed by the fishermen, that they visit Mount's Bay in large shoals during the summer. I at first supposed that the porpoise, *d. phocena*, was the species meant, by describing them to be so common, but Mr. Chirgwin says it is the present species, and that the fishermen call it the "bottle-nose." This we hope to verify during the coming summer. There are six species of *delphinus* recorded as

being caught in the kingdom, four of which have been captured in the Cornish seas; the present species *(d. delphis), d. phocena, d. orca,* and *d. melas,* the two former of which are now preserved in our museum.

I have been thus particular in describing the present specimen, from a wish having been expressed in the "Cornish Fauna," that such should always be done. For that "there is no class of the larger animals of which so little is definitely known as of the whale tribe;" it is therefore much to be wished, that in every instance where one is taken, or thrown on shore, that measurements and descriptions should be taken.*

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* During the latter part of February three specimens were caught at Plymouth; and many others have been seen off the Lizard since the specimen described above was taken.

Exuviation of the common Craw-fish (Palinurus vulgaris).

By Mr. E. CHIRGWIN.

HAVING recently witnessed, in two instances, what may be called the moulting of the common craw-fish, differing in some respects from the manner in which it is said to take place, I think it may be interesting to state the circumstance as it really happened. Two years since, in the month of July, one was taken in a trammel net, and being disentangled, and held up in the hand by its antennæ, a sensible shudder was given by the creature: immediately after which, it dropped from its shell to the bottom of the boat, leaving its old covering in the hand of its surprised captor, unseparated in any part, and not a joint broken. In August last another was caught in a similar way, and also cast its shell on board the boat. In this instance, as in the former, nothing called attention till after the shell had fallen off, when it appeared that the carapace had been lifted, and was nearly separated from the tail or flap. The new animal was lively and strong, and might be handled by its antennæ, but it was sensible of the slightest touch on any part of the body, which was evinced by its uttering a loud cry, as if in pain. During these months I have taken the craw-fish before the moulting has taken place, and this membrane has been so tough that it could hardly be torn by hard twisting. At this time they are unfit for food, but in a very short time, even when the new shell has not acquired a calcareous state, I consider them in the highest condition. It would seem, therefore, that it is during these months that the long-tailed *crustaceans* moult; but from finding the exuviæ of other kinds at other

seasons of the year, that the different kinds vary a good deal in this respect. Unless, therefore, the casting of their shells in these two instances, can be supposed to have been caused or accelerated by the situation and attendant circumstances in which the fish were found, it is evident that no softening or splitting of the shell, or divisions of the joints, take place, to enable the animal to extricate itself.

[The observations of practical men on any branch of natural history are always valuable, inasmuch as they are not distorted by any partiality for particular theories, or pre-conceived opinions; though they may be, and frequently are, erroneous, from considering isolated facts as general laws. The foregoing observations of Mr. E. Chirgwin are valuable, therefore, as the experience of one who is practically acquainted with all the fisheries of Mount's Bay, and without any theoretical predilections. Yet there are a few points that require a little explanation.

The experience on the exuviation of the craw-fish, given above, only proves that the shedding of the external calcareous covering takes place during the months of July and August, and not that it is confined exclusively to these periods. For the craw-fish, like other *crustaceans*, undergoes this process very irregularly, and at different periods of the year. When the young first escapes from the egg, the first shedding is effected within three days, and sometimes within the day; the second shedding does not occur for three weeks or a month, and then at irregular intervals, increasing in length as the creature increases in age. The young being born in a form entirely unlike the adult, the first and second changes are not merely a shedding of the shell, as it afterwards becomes, for the purposes of growth, but also the means of undergoing the metamorphosis necessary to its taking on the adult form. But, even after the creatures have undergone those changes, which may be deemed metamorphic, they do not immediately assume the adult form, though they have taken on the type of the adult developement. Thus, the first shedding occurs so soon after birth, but the second state is the one generally first seen; this lasts for a

few weeks, and another change and exuviation occurs, and again, in about a month, another shedding and change of form occurs, which is the last of the metamorphoses. At this stage, the permanent form makes its appearances. But the different species are so much alike in this young state, that it is almost impossible to discriminate between them. But at each shedding the form alters, and the specific characters become gradually developed. For the *crustaceans* appear to be formed on a common type, and during growth they become removed from this by the developement of some parts, and the obliteration of others, thus assuming their generic and specific characters. Thus, in their early changes, the exuviation is frequent, and even when half grown, they shed their shells several times during the year, but the full-grown animal very rarely does it, that is, only after long intervals; so that the exuviation in the above cases, during July and August, are only proofs that it occurs during these months, and not that it is confined to them. The mode in which this process occurs need not be enlarged on here, as it will be fully described in the forthcoming work of Professor Bell, on British Crustacea; but it may be mentioned as varying in different species. In the craw-fish, the first ring of the abdomen is disjoined from the carapace, as Mr. Chirgwin notices, and through this opening the animal escapes. In the crab the same disunion occurs, and the curved sutures on the anterior and inferior edge also become separated, while in the lobster the separation extends along the furrow on the back of the carapace, from the frontal point to where it joins the abdomen. The process of exuviation in the cases mentioned above was probably hastened by the position in which the creatures were held; but though more slowly, it is effected no less surely, by the creatures in a state of nature.]

Remarks on a new Zoophyte belonging to the genus Crisia.

By R. Q. COUCH, M.R.C.S.L., &c., &c.

[Plate 4.]

IT is now about two years since, while examining the *zoophytes* of the Cornish coast, that I met with two specimens of what I then thought might be varieties of the goat's horn coralline, *crisia cornuta*. Being, however, doubtful on the subject, I pointed out the probability of their being eventually found to be distinct, in the third part of the "Cornish Fauna," which contains the *zoophytes* of the county. Since that time I have had the good fortune to find several other specimens in Mount's Bay; and I have also detected it among a few corallines sent to me by Mr. Ralfs, from Ilfracombe. Having thus had an opportunity of examining and comparing many specimens from the shores both of Devon and Cornwall, I am now enabled to point out what appear to constitute the specific characters of each.

Crisia cornuta. Calcareous, confervoid; cells uniserial, long and tubular, with curved terminations *all turned in one direction:* a long bristle *above each cell.* *Fig.* 2.

This is a very delicate and brittle *zoophyte;* it is calcareous, confervoid, and varies in height to half an inch. It is composed of a single row of tubular cells, which are curved at their upper ends in such a manner that they all open in one direction; they are linked together in a single series, the termination of one being inserted into the angle of the other. The apertures are circular and even. *Above* the bent termination of each cell is a long

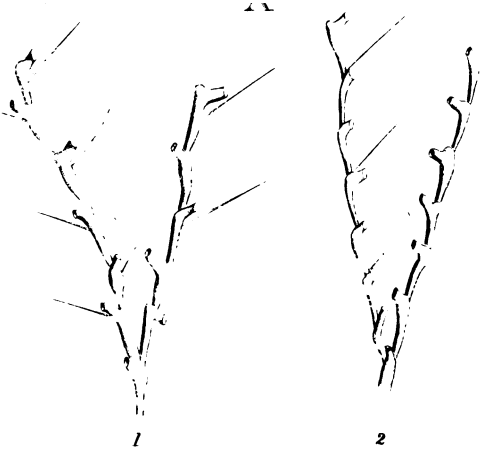
slender calcareous bristle, which is hollow, but, from its brittleness, is not frequently to be found in preserved specimens.

The characters of the new species, which I propose to call *crisia setacea*, are:—

Crisia setacea. Cells long, tubulous, with curved terminations turned *alternately in opposite directions*; a long bristle *below the aperture* of each cell. *Fig.* 1.

This is also a calcareous and confervoid species, but is more slender and grows to a greater height than the last, though I have found them much alike in these particulars. It is sparingly and dichotomously branched. Compared with the last species it presents a well-marked contrast, in having the bent necks of the cells turned in opposite directions, and the bristle is situated *below* instead of above the orifice. From the apertures of the cells being turned in opposite directions, the cells themselves might be said to be arranged in a biserial manner. This cannot, however, be considered as strictly the case, since they are inserted into each other at their terminations, and not by their sides.

Whether or not these two species have been included under the name *c. cornuta*, it is not easy to determine, but the specific characters of that species as given by Linnæus are not very definite when compared with those given by others. Linnæus, in Turton's edition, describes it as "denticles alternate;" so also does Stewart, who however probably copied Linnæus; while the modern species is described as having a single row of bent cells. From this it is probable that two species have been described under one name; and there can be no doubt that the one now described is distinct from the *c. cornuta* of Johnston and the "Cornish Fauna," and I here propose to separate them accordingly, trusting that the reasons assigned for so doing will satisfy all zoophytologists.



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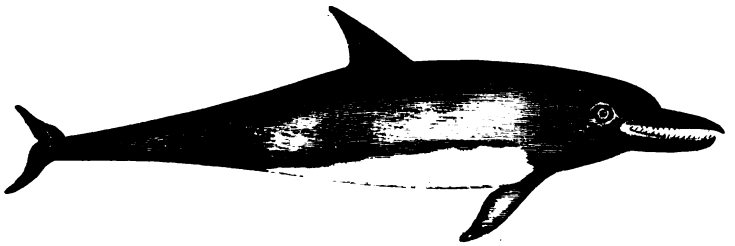

PROCEEDINGS OF THE GENERAL MEETING

OF THE

Antiquarian & Natural History Society

OF PENZANCE,

HELD IN THE TOWN COUNCIL ROOM ON 11TH SEPT., 1846,

JOHN PAYNTER, Esq., in the Chair.

The President, in addressing the Meeting, remarked that if the the progress of the Society had not been rapid during the past year, it had certainly not lost ground, and some knowledge of the Natural History of this west part of Cornwall had been obtained; in proof of which he need only refer to what appeared on the table before them: he then referred to the labours of the Geological Society, and hoped that both would advance in their useful pursuits. He remarked that he had the unpleasant task to refer to the death of one of their most active and useful members, Mr. E. Chirgwin, whom they must all lament.

The President then called on the Secretaries for their Report.

The Report having been read by Mr. E. H. Rodd,—*It was resolved,*—on the motion of Mr. Joseph Carne, and seconded by Mr. J. J. A. Boase, that the Report now read be received.

The following gentlemen were then appointed officers for the ensuing year:—

President.

John Paynter, Esq.

Vice-Presidents.

J. J. A. Boase, Esq. | J. S. Campbell, Esq.
E. Bolitho, Esq. | Col. Robyns.

Treasurer.

Richard Long, Esq.

Council.

J. Batten, Esq.	Joseph Carne, Esq.	R. Pentreath, Esq.
B. P. Batten, Esq.	J. Flamank, Esq.	Rev. M. N. Peters.
J. Boase, Esq.	Rev. W. Gorham.	J. Trembath, Esq.
C. B. Borlase, Esq.	R. Pearce, Esq.	

Secretaries and Curators.

E. H. Rodd, Esq. | J. N. R. Millett, Esq. | R. Q. Couch, Esq.

The President then called on Mr. R. Q. Couch for an Address on the Geographical distribution of Plants and Animals.

Resolved,—That the Report, Mr. Couch's Address, and the other Papers read before the Society during the past year, be printed and circulated among the members of the Society.

DONATIONS TO THE MUSEUM FOR 1846.

DONORS.	SPECIMENS.
F. Grantham, Esq.	Magpie; Ring Dove; Lesser Grebe, in summer plumage; Lesser Whitethroat; and a skin of the Harlequin Duck.
Mr. Varrant, *St. Erth*	Death's-head moth.
Mr. Symons, Druggist	Death's-head moth.
Dr. Millett, *Hayle*	Numerous insects and larvæ, from Hayle.
Purchased by the Society	A locust *(migratoria)*, caught in Penzance.
Richard Pearce, Esq.	Corrosso, or ivory-nut.
Masters J. & T. Hennel	A series of land and fresh-water shells of Penzance and the neighbourhood.
Royal Cornwall Geological Soc., by its Secretary, Dr. Willan .	A bronze celt.
Mr Flamank	A case of Chinese chop-sticks and knife.
Mr. John Stevens	Five coins, copper and silvered.
Mr. W. Thomas	A Danish copper coin.
Miss Pengelly	Three copper and silver coins.
Mr. M. Kistler	Silver coin.
Mr. Davey	Coins, copper.
Mr. R. Hugo	A sixpence of George the 2nd.
Mr. N. Rodda	A fork, found at the Folly.

REPORT.

IN presenting the Report of the proceedings of the past year to the attention of the society, the council has again to refer with pleasure to the increased exertions which the society has made, and to the great success which has attended these efforts. In the last Report, while the council observed with satisfaction that the society had been more than usually active, it yet feared that the effort might be merely temporary; but the experience of another year has shown that the revival of its energies is likely to be permanent, and productive of much benefit. During the past year we have ventured for the first time to publish a Report of our transactions, which we are glad to observe has been favourably received. We hope, therefore, that the society will be the means selected to publish any fact that may occur either to the naturalist or antiquary within the district of Penwith.

In the department of natural history, there are several rarities to be recorded. Among the *Cetacea*, the dolphin *(D. delphis)*, which was formerly supposed to be rare, has been found of common occurrence. A specimen of this species is preserved in our museum, and figured in our last Report.

Of the *Reptilia* it may be remarked, that the spawn of the frog was observed in road-side pools on the 20th of January, and that the observations made last year have been fully confirmed by those of the past season.

The past year has not furnished the society with many instances of the occurrence of rare birds in the Penzance district; it is nevertheless believed, that the general interest felt for this branch of natural history will ensure a record being made of any circumstance of interest occurring connected with it in the surrounding parishes. The last winter was one of unusual mildness in this as well as in every part of Great Britain, and this will in some measure account for the absence of many species of birds which in ordinary seasons visit the South of England with tolerable certainty, the temperature of the season generally regulating their numbers. This applies especially to the interesting family of *Anatidæ* (ducks), the numbers of the commoner sorts being very small, and the rarer species not appearing at all. The mild temperature of our winters, frequently induces many remarks and interesting notices from time to time respecting the protracted stay of the common swallow and martin beyond the usual period of their migration from this county as observed in other counties. In the last year one was observed as late as the 30th of November in St. Mary's churchyard, in this town: they were also observed on the 1st, 2nd, and again on the 4th, of April, on their return, in the heart of the town. The interval between the above dates, viz., from their departure to their arrival, although much less than is usual, fully admits of their accustomed southern habitations being visited by them; whilst the circumstance recorded, coupled with the character of the season, would seem to favour the supposition made by some that the stay of these birds in this country is in some instances perennial, as well as periodical in others. It is to be hoped, therefore, that the circumstances affecting this locality will ensure attention to the periods of the first and last appearances of the swallow tribe in the seasons of migration, and also to any isolated and extraordinary instances of their appearances in the winter season after the main body has departed.

Another example of the spoonbill, apparently a bird of the year, was obtained not far from the Land's-end, on the 8th of October last. The society may remember a notice of the capture of several of these birds from a flock which was observed in Gwithian some years since: one or two instances of its capture

before, and since that period have taken place; and although these occurrences have naturally taken away from its interest as a great curiosity, the society, nevertheless, feels a pleasure in placing on record the fact of the capture of a rare British bird, and one remarkable for a peculiar external organization. *Parus biarmicus* (the bearded tit), another bird of very rare occurrence in this county, and of singular beauty, was captured in the parish of St. Levan, in the latter part of January. It is believed that there is only one recorded instance of the occurrence of this bird before in Cornwall; but it is possible that the difficulty of access which its natural haunts afford, which are swampy fens overgrown with reeds, may be a reason for its having escaped notice.

The occurrences of rare fish during the past year have been carefully noted; and though we hope at some future time to present to the society an accurate list of those to be found in Mount's Bay, yet we cannot on the present occasion refrain from mentioning a few of the rarest taken since our last annual meeting. The torpedo, or the electric ray, has been taken by the trawl on four occasions near Mousehole island, so that an opportunity has been offered for ascertaining the species of our shores, which before had not been determined. The kind, figured and described by authorities as the British, is the *Raia torpedo* of Linnæus, but the species we have had an opportunity of examining is distinct, and approaches in description to the new British torpedo *(Torpedo nobiliana)* of Yarrell. A specimen is preserved in the museum. That exceedingly rare British fish the long-finned tunny has been taken in a mackerel-seine near Newlyn — the second recorded instance of its being found on the British shores, both of which occurred in Mount's Bay, and one is now preserved in our museum. The butterfly-fish has also been taken for the first time in Cornwall. The other rare fishes observed are the boar-fish, red band-fish, Hake's dame, and Yarrell's blenny.

In our last Report we expressed a hope that during the next year we should be able to advance the study of the entomology of West Cornwall; and this, by the zealous co-operation of Mr. Noye, we have been able to effect. The council need only refer to the list which will be delivered to the society to-day, and to the

cases of insects illustrating it, to show the value of his services; and they have also the satisfaction to observe, that preparations are made for continuing these valuable services during the next year. This has hitherto been a neglected portion of natural history, and the council would therefore enforce on the attention of members, the great advantage that would accrue to the society, if they would afford every facility to Mr. Noye in following up his pursuit, and in preserving every insect falling within their reach.

An advance has also been made in the study of conchology, and a valuable collection of shells has been presented to the society by a lady of this town. In addition to this, the council cannot refrain from particularly referring to a collection of the land and fresh-water shells of the immediate neighbourhood of Penzance, presented to the society to-day by two very young gentlemen, who are merely visitors to Cornwall. If then visitors to this delightful neighbourhood take such an interest in our pursuits, the council hopes that the example will not be lost on the residents of the district embraced in our researches.

The society has also, during the past year, carried its investigations, for the first time, into the department of botany. The council refers with pleasure to a Paper on the Mosses of West Penwith, by a member of the Botanical Society of Edinburgh, which was read at one of the monthly meetings, and will be printed in our next Report. A new locality for the *Hymen. Wilsoni* has also been discovered within our district by one of your secretaries.*

In the antiquarian department we have been more successful than at any former period. At two consecutive monthly meetings we have been favoured with remarks on the ancient customs of West Cornwall. These were so interesting that the author has been requested to continue his researches during another year.

The council is happy to announce, from the report of the treasurer, that the financial concerns of the society are in a solvent state: that the annual subscriptions, which will be collected in January, will enable the society to advance unincumbered with

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* Mr. J. N. R. Millett.

any debt. We may therefore now be considered free, and capable of putting forth our full energies for the ensuing year.

In this state of the society, the council would refer to the desireableness of organizing its members, and arranging them in separate classes, as honorary, corresponding, ordinary members, and associates, as may be thought best.

EDWARD HEARLE RODD,
J. N. R. MILLETT,
R. Q. COUCH,
} *Secretaries and Curators.*

Sept. 11th, 1846.

An Address, on the Geographical distribution of the Animal and Vegetable kingdoms,

DELIVERED BEFORE THE SOCIETY AT ITS ANNUAL MEETING:

By RICHARD Q. COUCH, Esq.,

ONE OF THE SECRETARIES.

AT the last annual meeting, in the Address which I had then the honour to deliver before this society, natural history was spoken of, not as a mere collection of unconnected facts, but as a branch of inductive science. It was shown to be, like all other departments of philosophy, governed by definite laws, which could only be discovered by careful investigation; and that however incongruous some creatures appeared to be, both in shape and habit, yet that all were united by intermediate links into an harmonious whole. It was then explained that the idea of wild irregularity in the productions of Nature arose from the contemplation of these distant points, and that it disappeared on a closer investigation, by the discovery of a graduated order of beings. It was observed, however, that the series was not complete,—that several of the links of the chain had been destroyed. But though, from this cause, creation seemed broken up into irregular masses, yet that the parts that could be examined were so perfect,—so indicative of order,—so demonstrative of design, that no doubt could be entertained, but that by the labours of the geologists, those chasms would be filled, and that the fragments of a former state would be found to be as harmonious as those already known.

From this department of natural history I would now direct your attention to another, equally important and interesting to the student of Nature; but one which has not received that attention from philosophic travellers which its importance demands. It is even at the present moment involved in much obscurity, though several of the circumstances regulating the phenomena have been satisfactorily ascertained. The subject to which I refer is the geographical distribution of the animal and vegetable kingdoms. Few things appear so evident, at first view, as the great diversity of Nature, and the irregularity with which her productions are scattered over the earth. On close investigation, however, this diversity resolves itself into perfect order, one class never supplanting the position of the other. All persons must be aware of the difference between a landscape of the torrid and the frigid zones; the rich—the teeming luxuriance and beauty of the one, standing in magnificent contrast to the bleak sterility of the other. What is here alluded to in the extremes, will be found in less contrasted forms in every climate of the earth. The character of organic nature varies with the climate: every degree presents a diversity of form, and every locality some new and unexpected habit. But similar climates, however widely separated from each other, however much isolated by unfavourable circumstances, have yet a general sameness in the character of their productions. This is especially the case in their Flora, which depends more than the Fauna on the temperature for its perfection. Whether the landscape be hill, or vale, or plain, it matters but little, since they are common to the whole earth; it is the form of the vegetation which gives the physiognomy to the scene.

The uniformity of the appearance of similar climes, have been in several instances carefully examined by eminent naturalists, and by none more successfully than the illustrious Humboldt. These observers have found that widely separated yet similar climates are not only clothed with the same genera, but in many instances with the same species of plants. Thus, the Andes, which in their course divide America into two unequal parts, have yet the botany on the shores of the Pacific identical with that on the banks of the Amazon. The passes across these mountains are so high and cold

that the idea of the migration of a tropical flora from one side to the other cannot be entertained: nor can it be supposed that such an extensive transportation could have been effected by the agency of birds; the cause is not sufficient for the effect. But a similarity of *flora* is observable in places still more distant from each other; for the cordilleras of America present the same phenomena as the Himalaya of India. It is this diversity, and yet unanimity, which renders the study of Nature so interesting, and wards off that satiety which a constant contemplation of the same subject must necessarily produce. The cruciferous plants, which abound in temperate climates, are but rarely found within the tropics.

The two most important circumstances influencing the growth of vegetation are climate and soil, the former of which affects the geographical range, the latter the local distribution. The temperature of a country, however, is not to be ascertained by its latitude, since the isothermal lines are neither parallel to the equator, nor the sun's path. It is also so modified by the peculiar distribution of land and water, of mountains, hills, or valleys, sandy or swampy plains, that nothing but actual observation can determine its character. But even of temperature, there are many peculiarities affecting climate: two places may possess the same mean heat and yet differ very considerably in their character. Thus, Humboldt observes, that at Peking, where the mean temperature of the year is similar to Brittany, the heat of summer is greater than at Cairo, while the winter is as rigorous as at Upsala: another instance may be found in the United States of America, where the summer of Rome and the winter of Copenhagen unite to form the year. These are called excessive climates. The insular is the one of less change, and this is the one enjoyed by Western Europe, and more especially by that portion of Cornwall it is our duty to explore.

The dissimilar influences arising from these excessive and insular climates must necessarily affect the vegetation of a district. Those regions with long-extended plains, are warmer than the mountain-ranges. The warmest position in every country is nearest the surface, and the temperature decreases as you ascend from the lowest level of the soil. In the Himalaya and the Andes, which rise from the plains of the torrid zone to the regions of eternal

snow, we have a succession of all the climates of the globe; and such districts may be said to contain an epitome of its productions. The line of perpetual snow varies, though irregularly, with the distance from the line: it is at its greatest altitude at the equator, and gradually sinks, till towards the poles it reaches the surface of the earth. At the equator it is at the altitude of 14,760 feet, while at the North Cape, in 71½° of latitude, it descends to 2,343 feet, and still further north it reaches the surface and finally passes below it; so that if a diagram of the isothermal altitude were made, it would take the form of an ellipse, having its polar axis shorter, and its equatorial diameter longer than that of the earth. This line is lower in America than in Africa; in the former, extensive ranges of mountains, large rivers, and the surrounding sea, reduces the temperature in summer, while the continuity of the land from the arctic regions to the equator allows the frigid air of the poles to reduce the temperature of the winter to a very low degree. In Africa, the burning deserts of sand, extending nearly over its whole length and breadth, send up their heat as from vast furnaces, communicating their influence even to Europe and Asia, modifying both climate and productions. The heat of Africa is dry and the soil is sandy; in America it is moist, from the mountain torrents; and the soil is rich. In tropical America we find vegetation in rank luxuriance, in Africa it is soon scorched and destroyed, hence many of the plants of one have no representatives in the other. In the new world, along the valleys of their magnificent rivers, the refreshing and cooling breezes of temperate Europe are to be enjoyed beneath a tropical sun, and in such situations the rich vegetation of the mountain descends and spreads in sheltered situations, and thus the parasitic and flowering plants peculiar to a torrid zone become mixed with those characteristic of a temperate clime. New Holland is known already to contain more than sixty species of European plants, and will probably be found to possess more. It is this diversity in the productions of the mountainous portions of the globe that renders these regions so interesting to the traveller. Every step he takes, not only changes the scene, but in some respects the climate, and with it the animal and vegetable productions. He has within his reach a survey in miniature of the

whole earth. In the plains of the torrid zone he sees the magnificent palm trees and date trees, magnolias, the sugar canes, and all those luscious fruits which he associates with luxuriance and a burning sun. Ascending, he finds the temperate belt, with its vegetation, luxuriant but not rank, rising in its most delightful forms; he beholds the cyprus, fuschias of every kind, evergreens, and all those flowers which beautify and adorn this delightful clime; the rocks add beauty to the scene, for the trembling branches of the mimosa hang in graceful pendants over every declivity. These, the more beautiful of Nature's productions, give way as he ascends to the oak, the elm, and the flowers of temperate Europe. It is here that he first beholds the shedding of the leaves in winter and the bursting of the buds in spring; here the trees attain their greatest size. But, ascending still higher, he sees that as the cold increases, the trees are not so large,—that the flowers are less numerous, less brilliant, and of smaller size. Higher still, and the firs, the arbutus, and other stunted evergreens appear; the frequent rains here cover the soil with a verdant carpet of moss. Still ascending, he finds the alpine plants nestled and sheltered in the crevices of the rocks, alike in the Andes and the Alps, pushing their yellow or blue flowers through the frequent snow. To this succeed the grasses, either alone or mixed with moss, which conduct the traveller to the regions of eternal snow; beyond this no vital being is found except the condor, the hugest of existing birds, which thus, amidst the clouds and ice, takes up his high and bleak abode.*

This law of distribution must be taken as a general one, for in the detail there are several remarkable variations, which cannot be passed unnoticed At present they cannot be explained; but this ought rather to stimulate inquiry, than check investigation, and serve as an inducement to this society carefully to investigate the productions of our own district, rather than to seek the mere gaudy productions of other climes. All plants cannot equally bear the same changes of temperature or soil; some are hardy, and have a very extensive range; while others, less robust, may be looked upon as local. Some are peculiar to a district, and of

* Humboldt.

these there are instances in our own neighbourhood. Some plants are fond of a sea-coast, and, if the country be a level one, are never found inland; such are the *Silene maritima*, *Statice armeria*, and *Cochlearea officinalis* and *danica*, and these are common on our shores: they are to be found in no other situations except in the higher parts of mountain-ranges, such as the Alps and Pyrenees. How this is to be accounted for we know not, nor shall we be able to discover, till further researches have been made.

What has been just observed, respecting the vegetable creation, will be discovered to exist also in the animal kingdom. We might at first suppose that as quadrupeds and birds are supplied with the means of rapid and extensive wanderings, they would not be confined within definite provinces; but, strange as it may seem, the wanderings even of the most migratory species are limited. This has always been considered so remarkable, that various theories have from time to time been invented to afford an explanation. Fleming supposed that every species in its distribution might be represented by a circle; in the centre of which it existed in the highest state of perfection and enjoyment; both of which decreased as they approached the circumference. Each species, therefore, required certain peculiarities for its full developement; each possessed its own circle, which, however, interlaced with those of the surrounding kinds, and it was in this manner that the apparent complication of Nature was effected. Other theorists have instituted zoological provinces, the centres of which contained the creatures supposed to give the distinguishing characters to each. Thus we have the American, European, African, Asiatic, and Australian provinces; each peopled by its own peculiar creatures. All these theories are founded on the supposition that the surface and climate of the various divisions of the earth are permanent; and that our globe is now as it was on the first day of its creation:—a supposition entirely without foundation:—a supposition contradicted by every day's experience. The Peregrine falcon of our own district is found throughout central Europe, Asia, and Australia, in situations widely separated from each other, by barren and level districts of vast extent, and even by the ocean, over which it is contrary to the habits of this bird to pass. But

we will suppose that such a bird, remarkable for its strength of wing, may have taken some unusual flight, and found some new locality favourable for its permanent abode. But what can be said of the wading birds;—a class well known for its deficient powers of flying? Short of wing, and possessing no other means of distant wandering, they are more widely diffused than birds of the boldest flight. This class predominates in what is called the European province; yet some of the species are found also in America, and of these, two only are birds of the arctic regions,—a point the most favourable for their passage, from the approximation of the land: others are found in Asia and Africa; so that this class, with its deficient wings, is more widely diffused than the eagle, proverbial for its powers of flight. The quadrupeds of Northern Asia assimilate to those of Northern Europe, and the general zoology passes insensibly into that of Australia and the islands of the Indian Ocean. The province of the new world extends from the arctic regions to Cape Horn, and embraces the productions of the frigid, temperate, and the torrid zones. How unnatural this is could easily be shown, but it is foreign to our present purpose. If these provinces are instituted as convenient groupings to assist us in our investigations, they may certainly be of use, but if designed as an embodyment of general facts, they are highly injurious, since they are not only founded on imperfect knowledge, but calculated to impede our progress; they suppose us to know what in fact we are still desirous of discovering. The united experience of all naturalists, from the earliest to the most recent times, proves that the zoology and botany of every country, though slowly, is yet always changing. This is not the case merely with the present era of our earth, for geology teaches us that it has ever been so. The globe, from the period of its creation to the present time, has been undergoing changes of the most important character, and all investigations of the distribution of the plants and animals must be made in reference to it. But, amidst all these revolutions, the economy of Nature has been uniform; her laws have resisted every change, and the scheme of the geographical distribution of life so apparent now, seems also to have governed it even so early as the Silurian age.

In opposition to the speculations of some visionary philosophers we must maintain, that the character of every creature is permanent, and that all are now, in every respect, as they came from the hand of their Creator:—that there is not a single instance in which it can be proved, that one creature ever grew into the form and character of another. These positions, which are capable of proof, must be the foundation of our success; without these all must be uncertainty and failure. With such land-marks for our guide, however, we can advance with decision, and may gradually unravel the living mysteries of our globe.

The creatures that inhabited our own country in remote ages are totally unlike any that now exist. Our shores once possessed gigantic reptiles, such as the world cannot now exhibit. In the most recent of the tertiary rocks on the shores of the Mediterranean, many shells are imbedded, or rather inclosed, which are identical with many now living in that sea; but many others are extinct. In the lower beds of the same rocks are found shells, which are not only of equal size and beauty, but identical, with those now inhabiting the Indian Ocean; while their representitives in the sea below are stunted and deformed. Thus, then, the geology of the Apennines indicate a climate and zoology, existing in ages long since past, similar to what is found in India at the present time. *Rostellaria curvirostris*, discovered in a fossil state near Turin, is at present found only in the Red Sea; and *Conus antidiluvianus*, only at Owyhee. The corals of the rocks of Cornwall are large and beautiful, and may vie with many from the South Seas; and they tell us that our county once enjoyed a climate far warmer than what we now possess. How great then have been the changes of the soil and climate of Europe; and not of Europe only, but of the whole earth! The present geographical distribution of plants and animals must, therefore, be the result of these extensive and complicated changes, and not the effect of any primary arrangement into provinces.

Some plants, as well as animals, have a greater capability than others of resisting changes, and these are generally the most widely diffused. African entomology includes many insects common both to India and tropical America. Many kinds of quadrupeds and

birds are widely distributed over a vast extent of country; while others are completely isolated, without even the possibility of wandering. How the latter got there, would indeed be a mystery, if all things remained permanently the same. Geological and climatic changes will account for a great deal. If we suppose extensive plains within the tropics to be elevated into mountainous ranges, those animals and plants, incapable of bearing the change of temperature which such an alteration would produce, would be annihilated, and their places gradually occupied by others from the surrounding and colder districts. If the entrance to the Mediterranean were blocked up by an elevation of the land, and the isthmus of Suez depressed below the level of the waters, the character of the creatures occupying the two seas would be greatly altered, for the inhabitants of each would be poured into the other. The fishes of the Indian Ocean might then wander to the shores of France, and those of the Atlantic to the Indian Ocean. But, though the living contents of the Mediterranean might thus be altered, sufficient would remain to tell us that that sea once communicated with the Atlantic. It is from evidence of this kind that we know the Mediterranean once communicated with the Caspian. Climate, therefore, though it may influence the stability of an animal in any district, cannot always be looked on as the first cause of its appearance there; for this may depend upon unknown influences, of which geological revolutions may form, perhaps, the most important. But climate is of primary importance as it regards the permanency of any arrangement. Warmth is highly favourable to the developement of life; hence both animal and vegetable existences teem beneath the tropics and decrease towards the poles. The phenomena of vital distribution, when examined in reference to every era of our earth, are highly interesting.

The opinions respecting the centres of creation, and that all creatures have radiated from several foci of life, created at distant intervals, must be passed over in silence. Whatever views may be entertained, the diffusion of some species is extraordinary; it seems as if there had been periods more calculated than others for the diffusion of particular forms of life, which have now passed away. Many of the fossil plants of this country have been discovered in

the coal beds of America and Australia, and the *Bellerophon* and *Orthocerates* pervade several series of rocks in widely-separated regions; the common sparrow of our own age and country is following the civilization of man from Lisbon to Kamtschatka. These creatures must have been able to bear a considerably greater change than others, and thus the more delicate become extinct. The salmon, for instance, is a fish of a cold and temperate climate; but if from any cause a river of the north should hereafter force itself into the sea in some warm region, as might happen in America, the salmon would be destroyed, since it is a part of its history, that it should perform an annual migration to the sea. A warm climate it cannot bear, and hence, in such a change it would become extinct; while the trout, not requiring such a wandering, might survive. Habit, therefore, has some influence in determining the range of some creatures. But there are points of great interest to be determined before the geographical range of animated creation can be ascertained or understood. Neither climate nor peculiarities of habit, can account for the concentration of such remarkable creatures in New South Wales. Darwin mentions that the only gull in the Gallipagos islands is not found in the adjoining groups; though the situation and habits of such a bird are favourable for extensive diffusion. These islands are, in fact, as remarkable as New South Wales for assemblage of rare creatures; for of the twenty land birds found on them, one only has been discovered in other parts. These islands are also, if I may be allowed the expression, the paradise of turtles, for there they are in profusion. New Zealand, with its great varieties of climate,—of hill, and vale and plain, extending 700 miles in length and 90 in width, possesses only one quadruped in a wild state, and that is a rat. These are points which require elucidation; though it is more easy to account for the absence, than the presence, of such creatures under these circumstances. Climate may, and does in a great measure, regulate the arrangement; and while at present it renders some creatures stationary, it produces migration in others, as is witnessed in our summer visitor the swallow. Yet we can imagine a totally different state of things,—an alteration whereby the swallow would have a fixed habitation, and the most

stationary of our birds might become a wanderer. There may be centres in which creatures exist in the highest state of perfection; and radiating from them, may degenerate, and finally disappear. But, as the geography of our globe is perpetually changing, the zoology and botany of one district may migrate and attain perfection in another. Geology tells us that it has been the case from the earliest periods; and our own experience confirms it to the utmost. But our knowledge of the geographical arrangement of life is as yet imperfect; and so also are most of the conditions affecting the distribution. The subject must be pursued inductively; every district must be carefully examined, and the observations recorded; and such, in fact, is a part of the duty of our institution. Our district is that of the Land's-end, including the whole of Penwith; and specimens of all its productions should be deposited in our museum. And while we should receive any donation that might be presented, our principal object should be, not the mere gaudy productions of other climes, but the produce of our own. With this in view, we have steadily advanced during the past year; and we hope, by the continued support of the members, to be enabled to prosecute our design in the season now before us.

On the Mosses of the neighbourhood of Penzance.

By ALFRED GREENWOOD, Esq., Member of the Botanical Society of Edinburgh,

CORRESPONDING MEMBER OF THE SOCIETY.

CONTINENTAL botanists have observed that the dampness of the English climate renders it particularly favourable to the growth of the *Cryptogamia*. West Penwith, from its possessing a larger share of humidity than most other places, might be expected to abound in this class of plants, and such we find to be the case.

In those tribes which have received the greatest share of attention, the number of species has been found to equal, if not exceed, that of any tract of similar extent throughout the kingdom.

The difference of soil and situation which the district presents, doubtless contributes to render it suitable for the growth of a variety of species: taking the mosses for example;—in the wooded valleys or bottoms, in the immediate neighbourhood of Penzance, we get some of the species which are chiefly found in those counties which abound in woods:—on the upland and boggy moors, besides those common to such places, a few of the subalpine species are found; and the stones and rocks scattered around are more or less covered with mosses which grow only upon such surfaces; whilst several kinds, one or two of considerable rarity, vegetate upon the rocks of the coast or in their cavities.

The following list of mosses found within ten miles of Penzance, comprising 140 species, though rather a long one for a district of the extent comprised, may perhaps be considered only as an approximation to the existing number, the northern and western coasts,

which are remarkable for the stupendous character of their rocks, here and there broken into narrow valleys, down which often runs a rapid stream of water, still remaining comparatively unexplored. As a further evidence of the probability of the above supposition, it may be stated, that the small portion of the coast which has been properly examined, viz., that from Penzance to Lamorna and from Hayle to St. Ives, although apparently of a nature not so favourable to the growth of mosses as what we have mentioned above, has produced some of our rarest and most interesting species; and that since the publication of the Guide to Penzance, 15 additions have been made to the list, although the search made for them has been nearly confined to the immediate vicinity of the town.

Andræa Rothii	Castallack Carne, a short distance from Lamorna, and on rocks at Kerris; abundant in both places. *Mr. Ralfs.*
Phascum subulatum	Frequent.
——— *axillare*	Field upon Newlyn cliff *(Mr. Curnow)*; but it has not been found for the last year or two.
——— *cuspidatum*	Banks in several places, but not nearly so common as in the eastern counties.
——— *rectum*	Near Newlyn:—plentiful between Penzance and Hayle.
Sphagnum obtusifolium	Bogs, common.
——— *acutifolium*	Ditto.
——— *cuspidatum* B* ..	Pools of water on a moor near Madron.
——— *contortum* B.....	*(Schimp.)* Abundant on Lezingie Moor near Rosehill, and upon a boggy piece of ground by the side of the pathway between Penzance and Trengwainton ponds;—but it is probably common in most or all of the neighbouring bogs, as the two places mentioned are the only ones where Sphagnum grows that I have examined since I have been acquainted with the species.

* The capital B, when subjoined to a species, is meant to signify that it is barren, or has not yet been found in fruit here.

Gymnostomum viridissimum.. Trunks of trees:—fruit not uncommon in this neighbourhood.

———— *truncatulum*.. (Pottia truncata, *Br.* & *Schimp.*) Everywhere abundant.

———— *crinitum* .... (Pottia crinita, *Wils. M.S.*) On the ground over a cave, between Mousehole and Lamorna.

———— *conicum* ..... Banks between Penzance & Hayle, and probably elsewhere.

———— *ericetorum* ... (Var.? Physcomitrium ericetorum, *Br.* & *Schimp.*, Gymnostomum fasciculare, *Hook* & *Taylor.*) Coast between Mousehole and the Land's-end; rather plentiful in wet places. *Mr. Ralfs.*

———— *fasciculare* ... (Phys. fasciculare, *Br.* & *Sch.*) Frequent in wet meadows; sometimes found in other and dryer situations.

———— *pyriforme*.... Common.

———— *microstomum* . St. Michael's Mount; a single tuft only gathered.

Anictangium ciliatum ..... Rocks and stones on the moors.

Schistostega pennata ..... Love Lane and other places in moist recesses of banks; fruit rare.

Diphyscium foliosum ..... Banks near Choon. Road-side above Trengwainton Carne. *Mr. Curnow.*

Weissia affinis..... Cliff between Mousehole and Lamorna, along with Pottia crinita.

——— *cirrata*..... Sparingly on a stone in Trevayler Bottom. *Mr. Ralfs.*

——— *curvirostra* ..... Bank near Hayle Causeway. *Mr. Ralfs.*

——— *controversa* ..... Everywhere common.

——— *verticillata* B ..... Wet rocks on the coast between St. Ives and Hayle.

Grimmia maritima ..... Common on maritime rocks above high-water mark.

———— *pulvinata* ..... Stones on Madron Moor, and near Bologgas, and on a wall at Alverton; but always in small quantities, although such an abundant moss in the eastern counties.

Didymodon purpureus	Very common.
——— *trifarius*	Coast near Newlyn; on a wet wall at Hea; but most abundant around Hayle.
——— *flexicaulis* B....	Sennen Green, near the Land's-end. *Mr. Borrer.*
——— *brachydontius* B.	(Trichostomum mutabile, *Br.* & *Schimp.*) Coast between Saint Ives and Hayle.
Trichostomum fimale.....	Tolcarne, Newlyn; very sparingly in fruit.
——— *lanuginosum* B.	Stones upon Madron Moor.
——— *canescens*, var. *ericoides* B..	On the ground upon Chy-an-hâl and Kerris moors.
——— *heterostichum* .	Common on rocks and stones upon the moors.
——— *aciculare*.....	Plentiful in the rocky streams; it sometimes occurs on stones in rather dry situations.
——— *fasciculare* ...	Not nearly so abundant as the last; fruit rather scarce.
——— *pollyphyllum*..	On stones, common.
Dicranum bryoides	Banks, &c., everywhere.
——— *osmundioides*.....	In caves of the southern coast.
——— *adiantoides*	Banks; the fruit is scarce.
——— *taxifolium*.....	Ditto; fruits upon Newlyn cliff.
——— *glaucum* B	Bogs.
——— *flexuosum*	Heathy moors, rather common.
——— *squarrosum* B....	North coast near Morvah.
——— *scoparium*	Bologgas. *Mr. Ralfs.*
——— *Scottianum* B ...	Lamorna. *Mr. Ralfs.*
——— *Dillenii*	Abundant on the moors.
——— *varium*	Bank near Penzance; plentiful in an old clay-pit near Copperhouse.
——— *heteromallum*	Common.
Tortula rigida	Wall-tops, &c., frequent.
——— *muralis*	Common.
——— *ruralis* B	On the ground in many places.
——— *lævipila*.....	(Barbula lævipila, *Br.* & *Sch.*) On trees; not very common.
——— *unguiculata*.....	Abundant everywhere.

Tortula fallax ..... Foliage in many places; fruits on a wall near Bologgas.
Polytrichum undulatum .... Common.
——— *piliferum* ..... On commons, &c.
——— *juniperinum* .. Ditto. I have met with several specimens of this moss with two distinct setæ arising from the apex of the stem, but having the calyptræ closely united "by their hairy covers, thus forming as it were a two celled calyptra," precisely as mentioned by Mr. T. Sansom of P. commune, (Phytol. 93) who gives a detailed account of this monstrosity.
——— *urnigerum* B .. Chy-an-hâl Moor.
——— *commune* ..... Very common.
——— *aloides* ..... Ditto.
——— *nanum* ..... Ditto.
Entosthodon Templetoni .... Pathway along the cliff between Hayle and St. Ives.
Funaria hygrometica..... Common.
Zygodon conoideus ..... Sparingly on a single tree in Trevayler bottom. *Mr. Ralfs.*
Orthotrichum affine, and *b. pumilum*.. Common.
——— *diaphanum*... Common on trees; sometimes upon stones.
——— *crispum*..... This species here covers the trunks of trees in dense masses, but very rarely produces fruit; whereas in the eastern counties it always occurs in small patches, which fruit freely. In this neighbourhood it is also found on stones by the coast.
——— *pulchellum* ... On elder trees in Kenegie Bottom, near Badger's Cross. *Mr. Ralfs.*
Bryum palustre ..... Bogs; fruits on Tremethick Moor.
——— *carneum*..... Old clay-pit near Copperhouse. *Mr. Curnow.*
——— *argenteum* ..... Common.
——— *capillare* ..... Ditto.

Bryum cæspititium ..... This has been gathered in the neighbourhood, but I forget where; it appears not to be common.
——— *atropurpureum* ..... Frequent on wall-tops, &c.
——— *inclinatum* ..... Near Lelant.
——— *erythrocarpom* ..... Chy-an-hâl Moor.
——— *nutans* ..... Cliff near Newlyn.
——— *alpinum* ..... Barren state, rather frequent in wet places upon the cliffs beyond Mousehole: it fruits upon Chy-an-hâl Moor.
——— *ventricosum* B ..... Bogs.
——— *ligulatum* ..... Everywhere common in the barren state; bears capsules in Trevayler Valley.
——— *punctatum* ..... Sides of streams, frequent.
——— *hornum* ..... Abundant and generally fruiting.
——— *cuspidatum* B ..... Banks in several places.
——— *Tozeri* ..... When barren not uncommon upon the coast; fruits in a recess of the cliff near Newlyn. *Mr. Curnow.*
Bartramia pomiformis ..... Banks, common.
——— *fontana* ..... Bogs, not often bearing capsules:
——— *rigida* ..... a small variety is found in fruit by the coast near Mousehole, and also on the coast.
Pterogonium Smithii B .... On the trunk of a tree in Trevayler Valley.
——— *gracile* B ..... Tolcarne, Newlyn. *Mr. Ralfs.*
Leucodon sciuroides B ..... Tree in Love Lane, Penzance, but in very small quantity; whereas in the more midland counties, this is one of the commonest mosses on the trunks of trees.
Neckera pumila B ..... Somewhat sparingly upon trees at Castle Horneck, and in Trevayler Valley.
——— *crispa* B ..... Pathway along the cliff between St. Ives and Hayle; also on the north coast.
Daltonia heteromalla ..... Common on trees.
Fontinalis antipyretica B.... Not uncommon.

Fontinalis squamosa ..... Abundant in all the rapid streams; fruits in Trevayler Valley.

Hookeria lucens ..... Sides of streams, rather common.

——— *lœte-virens* ..... Mousehole Cave; very sparingly in fruit. *Mr. Ralfs.* This rare moss was also discovered by Mr. Borrer in another cave between Mousehole and Lamorna, but we fear it is now extinct there, as Mr. Ralfs and myself searched the spot diligently in the winter of 1844, but were unable to find a vestige of it.

Hypnum trichomanoides .... This moss, so very common in Essex, seems to be rare here; I have detected only one patch, which grew on the bank by the side of Trannack Lane, leading to Chyandour;—it bore a few capsules.

——— *complanatum*..... Abundant, but the fruit is rather scarce.

——— *undulatum* B ..... Rather frequent.

——— *denticulatum*..... Common.

——— *serpens*..... Ditto.

——— *populeum* ..... Common on stones.

——— *stramineum*..... On a boggy piece of ground by the side of the pathway leading from Penzance to Trengwainton ponds, where it appears to fruit very sparingly indeed.

——— *purum*..... ... Common, but rare in fruit.

——— *piliferum* B ..... Not unfrequent on banks, &c., in shady places, which this species seems chiefly to affect.

——— *Schreberi* B ..... Common.

——— *catenulatum* B ... On stones in several places; particularly abundant in some of the maritime caves.

——— *plumosum* ..... Stones, &c., by the sides of streams, not uncommon in fruit.

——— *sericeum* ..... Trees, abundant; not often fruiting.

Hypnum lutescens B ..... On the ground in various places.
——— *albicans* B ..... This I have observed in abundance upon Marazion Green, but being generally common, it doubtless grows elsewhere.
——— *alopecurum* ..... Common in fruit.
——— *curvatum*..... Tolerably frequent.
——— *myosuroides* ..... Common; it seems generally to grow here on stones.
——— *splendens*..... Frequent; fruit occasionally met with.
——— *proliferum*..... Common; fruits in many places.
——— *prælongum* ..... Abundant everywhere.
——— *flagellare* B ..... Upon stones by the margin of the stream in Trevayler Valley.
——— *blandum* B ..... Banks, not uncommon.
——— *rutabulum*..... Probably the most abundant species of the genus here and elsewhere.
——— *ruscifolium* ..... Wood or stones by the water are rarely unaccompanied by this moss.
——— *striatum* ..... Common in fruit.
——— *confertum* ..... Very common.
——— *cuspidatum* ..... Bogs; in fruit at Tremethick Moor and Marazion Marsh, and also near Copperhouse.
——— *polymorphum* B ... Between St. Ives and Hayle.
——— *stellatum* B ..... North coast near Morvah, and on Kerris Moor.
——— *loreum* B ..... Heathy places not unfrequent.
——— *triquetrum* ..... Common; in fruit near Bologgas, and in Trevayler Valley.
——— *brevirostre* B ..... Shady places, pretty common.
——— *squarrosum* B..... Abundant.
——— *filicinum* B ..... A large variety upon rocks by the sea where water runs down, near Mousehole and at Hayle.
——— *palustre* B..... On a weir at Trengwainton Pond, and upon stones in the stream at Trembath Mills.
——— *fluitans* ..... On Kerris and Chy-an-hâl moors; in fruit at the latter place. *Mr. Ralfs.*

Hypnum aduncum ..... On the boggy spot by the side of the path leading from Penzance to Trengwainton, where a few setæ rising up were observed; but the moss being usually common without fruit, surely occurs elsewhere in the district.

——— *uncinatum*..... In fruit upon Kerris Moor, near a few cottages called I believe Lower Kerris.

——— *scorpioides* B ..... In the standing water upon Tremethick Moor.

——— *cupressiforme* ..... Everywhere. A small variety with an erect cylindrical capsule and rostrale lid is very abundant upon apple trees, &c.

——— *molluscum* B..... Plentiful by the side of the path along the cliff between Hayle and Saint Ives: also, very sparingly at Newlyn.

I may remark, that the following species, so common in the eastern or midland counties, are either totally wanting or rare here: viz.,—*Grimmia apocarpa, Tortula subulata, Bryum roseum, Hypnum velutinum,* and *Anomodon viticulosum.* For the first four, situations abundantly suited to their growth appear commonly to occur in the neighbourhood; for the absence of the last, the deficiency of wood in this part of the country may account. Probably further investigation may detect some of them.

ALFRED GREENWOOD.

On some Ancient Customs in the western extremity of Cornwall.

By RICHARD EDMONDS, Jun., Esq.

THE following customs of the ancient inhabitants of this neighbourhood, are still observed at our four principal annual festivals: and these festivals, though now kept as christian holidays, were probably once held in honour of the sun, moon, and stars.*

I. *Midsummer Festival of the Sun.*

It is the immemorial usage in Penzance and the neighbouring towns and villages, on Midsummer-eve, to kindle bonfires and torches, and on Midsummer-day to hold a fair on the quay, where the country folks assemble in great numbers to make excursions on the water. St. Peter's-eve (the fifth from that of Midsummer) is distinguished by a similar display of bonfires and torches, although the "Quay-fair" on St. Peter's-day has been for some years discontinued. This festival in former times lasted probably about a week — the interval from Midsummer-eve to St. Peter's-day.

On these eves, a line of tar-barrels, relieved occasionally by large bonfires, is seen in the centre of each of the principal streets. On either side of this line men and women pass up and down, swinging round their heads heavy torches made of large pieces of folded canvass steeped in tar, and nailed to the ends of sticks three or four feet long: the flames of some of these almost equal those of the tar-barrels. Rows of lighted candles, also, when the air is calm, are fixed outside the windows or along the sides of the streets, while rockets, and fireworks of all descriptions, are let off in various parts of the town. Viewed from the bay, the shores

* Deut. iv. 19.

present an animating appearance, there being scarcely a village along the coast without its bonfire or torches. At the close of the amusements, when the fires are almost spent, a great number of men and women, chiefly from the neighbourhood of the Quay, used always, until last year (1845), to join hand in hand, forming a long string, and run through the streets, playing "thread the needle," heedless of the fireworks showered upon them, and oftentimes leaping over the yet glowing embers. For a few hours previous to the fire exhibition, children may be seen in the streets wearing wreaths and garlands of flowers — a custom in all probability originating from the ancient use of these ornaments when they danced round the fires.

Such are the remains (here extant) of the worship once paid to the sun by all the northern nations of Europe. "Can any one," says Gebelin in his *Allegories Orientales*, "overlook the St. John fires, kindled on the very moment of the Solstice, by the greatest part both of ancient and modern nations?—a religious ceremony observed for the prosperity of states and people, and to dispel every kind of evil. The origin of this fire still retained by many nations, is very simple. It was a *feu de joie* kindled the very moment the year began; for the first of all years, or the most ancient that we know of, began at the month of June."*

This ancient festival of the sun has now given place to that of John the Baptist, "*a* burning and shining light," sent forth to prepare the way of "*the true* light, which (like the sun) lighteth every man that cometh into the world." It is also kept in honor of St. Peter and St. Paul, whose martyrdoms are celebrated by the Romanists on the 29th of June. These festivals, therefore, of the three chief ministers of our Lord — all held within the same week — may be considered as the festival of our Lord himself. But there is a festival near the summer solstice dedicated *directly* to Him who is typified by the sun—*fête Dieu*, or *Corpus Christi* —on which day the largest fair in Mount's-bay is held at Penzance, where numerous shows and amusements are provided for the recreation of the thousands who then pour in from the neighbouring parishes.

* Histoire d'Hercule, p. 203.—Quoted in Polwhele's Cornwall, vol. i., p. 51.

II. *Festival of the Moon.*

The spring festival, which was kept between the vernal equinox and the beginning of May, seems to have been originally that of the moon.

On the 1st of May, about day-break, parties of young persons accompanied with music go into the country, regale themselves at the dairies, and return soon after sunrise with flowers and green branches. With these they formerly adorned the May-pole and danced round it. The last that remained in this neighbourhood stood at Marazion about thirty years ago. In the Scilly Isles, however, the May-pole is still preserved, and annually decorated. Throughout this day, and for two or three weeks afterwards, there is an incessant blowing of horns, with which most of the little boys among the labouring classes are furnished— a custom said to be derived from a festival of Diana.*

In the ancient borough of Helston,† the spring festival is held on the 8th, instead of the 1st, of May, in consequence, no doubt, of the 8th being the festival of the apparition of its tutelary angel, St. Michael, to whom its church is dedicated, and whose conflict with the dragon is represented in the town arms. In that borough families of the first respectability take part in the amusements. The shops are all closed, and numerous visitors from the neighbouring towns unite with the inhabitants in celebrating the festival. At daybreak, the men-servants and maid-servants commence the festivities by dancing into the country to partake of the usual refreshments, and gather flowers and green boughs, with which they return after sunrise and dance through the town. At one

* Fosbroke's Encyclopædia of Antiquities, p. 578.

† This borough is remarkable, not only for the singular custom described in the text, but also for being one of the very few places in England, where the inhabitants still play at bowls on the public bowling-green. In reference to this amusement, Strutt (Sports of England, edited by Hone, p. 268), writing about fifty years ago, says,—"Bowling-greens are said to have originated in England, and bowling upon them in my memory was a very popular amusement. In most country towns of any note, they are to be found, and some few are still remaining in the vicinity of the metropolis, but none of them I believe are now so generally frequented as they were formerly."

The only town in Mount's-bay that possessed a bowling-green is the ancient borough of Marazion. There was one also near the church of the populous parish of Paul. But it is now nearly sixty years since gentlemen have played at Marazion, and about thirty years since they played at Paul.

o'clock, the ladies and gentlemen, with flowers in their dresses, dance through the streets, private houses, and gardens, in exercise of their immemorial privilege. During the afternoon other parties of dancers pass through the town in the same manner. A ball concludes the day; and until within the last three or four years the gentlemen with their partners, all in ball dresses, re-appeared in the public street, and danced from thence into the assembly-room, thus opening the ball; but this part of the ceremony has now been dispensed with.

The tune to which they dance "is supposed (says Mr. Davies Gilbert) to be a remnant of British music; one very like it, if not the same, has been found in Ireland, and according to report, in Scotland. It is preserved by Edward Jones in his Musical and Poetical Relics of the Welsh Bards."* These relics I have not seen; but the following is a correct notation of the air as immemorially played at Helston on this day:—

The Furry Dance.

Con Spirito.

That this festival at Helston was originally instituted to commemorate the return of spring is evident, not only from the time of the year in which it is held, and the manner of its celebration, but also from the chorus of the song still chanted on the occasion. It is true that the song itself contains allusions to modern events, but the chorus, which I take to be an old translation of the original song, has all the marks of ancient simplicity, and naturally expresses the ideas uppermost in the minds of those who were rejoicing at the departure of winter, and welcoming the return of spring.

"And we were up as soon as any day—o—
"And for to fetch the summer home—
"The summer and the May†—o—
"For summer is a come—o—
"And winter is a gone—o."

The tune or chant applied to this chorus is very different from that above given to which they dance.

* Gilbert's Cornwall, vol. ii., p. 166.

† The green branches and flowers brought in from the country are called "May,"—just as the evergreens which adorn our churches and houses at Christmas are called "Christmas."

Many consider this festival to be the remains of the Roman *floralia*, and the day therefore has been latterly called *Flora-day*. But from what has been now stated, as well as from its ancient and still popular name, "*the Furry*," there is reason for supposing it was observed in this island long before the Romans visited it.

Furry or *forray*, "forage," appears to be derived from the same root as the Welsh word *fforio*, "to spy out,"* and the Cornish word *forrior*, "a thief;"† and therefore *forray*, *fforio*, and *forrior*, as well as the festival of the *Furry*, are all apparently of ancient British origin. "To make a *forray* and get spoil in the country," is the very object of the Helstonians, when sallying forth at daybreak into the country with drums and fifes playing the *forray* tune. Trees, shrubs, and gardens, are stript and plundered, in order that the leaves and flowers may adorn their streets and ball-rooms; and such is the completeness of the spoliation, that when it is over, an ungathered flower can scarcely be found. Hence, the privilege already mentioned of dancing through the houses and gardens. At a *forray* of this description, Flora herself might without inconsistency have presided: so we need not be surprised at the holiday being called after her name by some modern writers.‡

This going out to welcome and bring in May—the most beautiful month of the year—seems the natural expression of joy and gratitude on exchanging the barrenness of winter for the beauties of spring. The festival, therefore, was probably observed by all the nations of Europe, ages before the Christian era. And to what heavenly body could the idolatrous heathen have dedicated it more appropriately than to the moon, whose monthly renovation is naturally associated with the annual renewal of the face of nature at the commencement of spring? In fact, the goddess Easter‖ or Eastre, whose festival was kept by the Saxons throughout the month succeeding the vernal equinox, is universally supposed to have represented the moon. Moreover, the object of the festival

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* Owen's Welsh and English Dictionary. † Borlase's Cornish Vocabulary.

‡ Clavis Calendaria, vol. i., p. 330.

‖ East signifies "rising," and the name Easter is therefore singularly appropriate to the festival of the resurrection.

was to implore an abundant supply of the fruits of the earth; and it has always in all countries been supposed that the moon was greatly instrumental in effecting this, not only *indirectly* by her influence on the weather and by regulating the fall of rain, but also *directly* by the action of her light on vegetation.*

The worshippers of the sun were purified with fire, those of the moon with water, which, from its reflecting the light and image of the sun, and its other qualities, is as appropriate an emblem of the "Queen of heaven," as fire is of the "King." Hence, in the north-east of this Hundred, near Portreath, there is an ancient custom of bathing in the sea on the first three Sundays in May; whilst in the parishes near Penzance, persons having weak or diseased children take them to Madron Well, or to that of Chapel Euny, on the first three Wednesdays in May, an hour before noon, and dip them three times in the water, in the hope of restoring them by this operation to health or strength; although they would not suppose that these waters had any virtue if resorted to on any other days of the year, or at any other hour of the day. This superstition continues almost as prevalent as when Dr. Borlase described it nearly a century ago. So also at Padstow, the "hobby horse,"† or effigy of a horse, is, at this festival of the moon, dipped in a pool of water, and for the same reason, perhaps, that a similar figure was, in Ireland, passed through fire at the festival of the sun: viz., to preserve their cattle, which were all represented by it, from death and disease.‡ It is possible that these dippings for the cure of bodily diseases, and for preservation from evil, might have had some connexion with the baptism in the Red Sea, which occurred at this season of the year, or with christian baptism, which was once confined to this season — for many heathen practices are traceable to corrupted traditions of facts recorded in scripture. But it is equally possible that they were of much earlier date, for when men began to worship the sun, and the moon, Nature herself might have taught them, when thus perverted, that the way of access to these idols was through fire and through water, the two elements by which they were represented.

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* Deut. xxiii. 14. † Drew's Cornwall, vol. i., p. 730.

‡ Gentleman's Magazine, 1843 (July), pp. 23, 24, and 1795, pp. 125, 274.

The moon, which has always governed the moveable feasts of the Jewish and Christian churches, as well as the religious festivals of the heathen, is considered by divines as typical of the church; and its monthly disappearance and re-appearance are not less symbolical of her own death and resurrection, than of those of her Lord:—it is therefore, not a little remarkable, that the great festival of the moon should have given place to the resurrection festival of the church of which it is the type. It is also remarkable that the spring quarter commences with the festival of the Virgin Mary, whom the Romanists idolatrously regard as the "Queen of heaven."

III. *Festival of the Stars.*

Whilst our general festivals were dedicated to the sun and moon, our local ones seem to have been held in honor of the stars, the supposed departed spirits of great benefactors, or shining lights, in the places where they had dwelt. These might still be called the festivals of the stars, inasmuch as most of them are kept professedly in memory of the saints by whose instrumentality christianity was planted here. According to the injunction of 28 Henry 8, the only authorized time for holding these local feasts is the first Sunday in October—between the feast of "St. Michael and all Angels," and the kindred festival of "all Saints:" and as St. Michael* is supposed to be our Saviour—the guardian Angel of the whole church, whether in heaven or on earth, and our only Mediator—this injunction might serve as a protestant declaration against the antiscriptural doctrine of the mediation of departed spirits. The royal mandate, however, was not generally complied with, and in most cases each parish begins its feast, as before, on the Sunday nearest, or next after, its own saint's day. The feast lasts about three days, during which the inhabitants entertain their friends from other parishes, whose visits they will have an opportunity of returning before their own feast again comes round.

The common athletic amusements on these occasions, were formerly quoits, wrestling, and hurling. The last being apparently confined to Cornwall, merits particular notice. In this play, about

* See Dan. xii. 1. Rev. xii. 7. The name Michael signifies "who is like God."

a century ago, two or more parishes contended against certain other parishes, each party having its own goal, which was either the mansion-house of one of the leading gentlemen of the party, a parish church, or some other well known place. A ball about the size of a cricket ball, formed of cork or light wood and covered with silver, was hurled into the air midway between the goals. Both parties immediately rushed towards it, each striving to seize and carry it to its own goal. In this contest, when any individual having possession of the ball, found himself overpowered or outrun by his opponents, he hurled it to one of his own side, if near enough; or, if not, into some pool, ditch, furze-brake, garden, house, or other place of concealment, to prevent his adversaries from getting hold of it before his own company could arrive. "The hurlers (says Carew)* take their way over hills, dales, hedges, ditches,"—"through bushes, briars, mires, plashes, rivers"—sometimes "20 or 30 lie tugging together in the water scrambling and scratching for the ball." This Cornish exercise resembled so strikingly the present ball-play of the North American Indians, that a description of the latter may be here introduced as equally applicable to the former. "It is no uncommon occurrence (says Catlin)† for six or eight hundred or a thousand young men to engage in a game of ball, with five or six times that number of spectators. In their desperate struggles for the ball hundreds are running together and leaping actually over each other's heads, and darting between their adversaries' legs, tripping and throwing and foiling each other in every possible manner. Every mode is used that can be devised to oppose the progress of the foremost who is likely to get the ball, and these obstructions often meet with desperate individual resistance which terminates in a violent scuffle, and sometimes in fisticuffs." The great difference between hurling and the Indian ball-play is, that in the latter, the ball is never touched by the hand, but every individual carries two sticks with a sort of pouch at the end of each, with which he strives to take up the ball and throw it through the wicket or goal of his own

* Survey of Cornwall (Edition by Lord De Dunstanville), p. 197.

† The Manners, Customs, and Conditions of the North American Indians, by George Catlin (1842), vol. ii., p. 128.

party. The remarkable similarity between the two games argues the high antiquity of each.

The hurling above described was played principally in the west of Cornwall, and was called "hurling to the country." There was another kind practiced chiefly in the east of the county, termed "hurling to goals," of which also Carew has given a description. Besides these there was yet another species—played generally by a town against the surrounding country, by one part of a town or parish against another, or by the married men against the single. The following description of this last kind of hurling, as played at the present day in St. Columb, was given me by a gentleman who has often engaged in it:—

In the afternoons of Shrove Tuesday and the Saturday-week following, the shops being closed and business suspended, many hundreds of persons of all ranks from the town and country are assembled in the streets waiting for the hurling of the ball, the townsmen forming one party and the countrymen the other, each having its own goal,—a low granite post with a concavity in the top to receive the ball. The goals are about one mile and a half apart, having the town midway between them. The party which wins the game by lodging the ball at its own goal, keeps it as a trophy until the following year. When the ball is first thrown into the air the person who succeeds in catching it runs with it immediately towards his own goal—but he is quickly pursued by some of his opponents and overtaken. The moment the pursuer touches the holder of the ball and cries "stand and deal your ball," the latter is obliged, by the rules of the game, to part with it, which he does generally by throwing it to some one of his own party; but oftentimes he hurls it from the street over the houses into the private grounds of the inhabitants. Wherever it descends the hurlers follow it, no place being privileged, so that they frequently enter shrubberies, gardens, and houses. St. Columb is the only place where gentlemen now unite with the rest of the inhabitants in this diversion.

At Helston and St. Ives the play is nearly as at St. Columb, except that there is but one goal, which in Helston is the Guildhall door, and in St. Ives a pole on the beach. At the former borough

it is held on Ascension-eve, when the bounds of the town are renewed; at the latter, on Monday and Tuesday of the "feast-week," which commences on the Sunday nearest to Candlemas-day. In Helston, two streets contend against all the rest; in St. Ives, all the "Toms," "Wills," and "Johns," are on one side, while those having other christian names range themselves on the opposite. The aim of each party is to touch the goal with the ball, and to prevent the adverse party from doing so.

A fourth description of hurling still remains to be noticed. It is played annually at the parish feast of Germoe, seven miles from Penzance. There the hurlers, instead of forming two parties, act independently, every individual striving to catch the ball for himself, and whoever succeeds in lodging it thrice at the goal wins the game and obtains a prize.

Hurling of every kind, is now, I believe, discontinued throughout the county, except at the places above mentioned.

By the kindness of Richard Pearce, Esq., I am enabled to exhibit at this meeting two hurling balls, won above a century ago by his ancestors of Kerris, in the adjoining parish of Paul. The older one is two inches and three-quarters in diameter, and bears the following inscription in the Cornish language:—

"Paul Tus whek Gware Tek heb ate bus Henwis. 1704."

The first two words signify "Paul men," the owners of the ball. The last seven words may be Englished, in the order of the engraving, "sweet—play—fair—without—hate—to be—called"—being nearly equivalent to "Fair play is good play."

The other silver ball, three inches in diameter, has the following English inscription:—

"The married men against the young.
The gift of John Sickler to the Parish of Gwinyar, June 11th, 1748."

Cornwall is still famed for its wrestling, although that game, as well as the game of quoits, is not so general as it was fifty years ago.

IV. *Midwinter Festival of the Sun.*

The first of our annual festivals is that of the Nativity—for, as we date from the birth of Christ, Christmas-day is clearly the first

day of "the year of our Lord," and prior to the Conquest,* we began the year with that day—a commencement still retained in the quarters into which the year is divided, Christmas-day being the first day of the first quarter. And the 25th of December, by the Roman calendar † in our Lord's time, was the very day of the solstice—when the year, which is ruled by the sun, would naturally have commenced. At this season, the Romans, as well as the northern ‡ nations, held a festival in honor of the sun—represented by Saturn and Janus amongst the former, and Thor || amongst the latter. These gods presided over time and the four seasons of the year, and were in many respects striking shadows of the sun's great antitype—their histories being apparently gathered from patriarchal tradition, but so corrupted, that were not the original truth elsewhere preserved, we should be utterly unable to distinguish it.

Some of the ceremonies with which the festival of the sun was observed among the northern nations at the *summer* solstice have been already described. His *winter* festival in the north appears to have resembled that of Saturn in the south, and to have been accompanied with many of our present Christmas observances.

At the Saturnalia, universal festivity and freedom prevailed, while masters waited on their slaves at dinner, in commemoration of "the golden age" of Saturn, when the earth, without labour, brought forth abundantly, and when men lived as brethren. So also, at our Christmas festival, in memory of the first advent of Him, who though Lord and Master over His disciples, was unto them as one that served, the houses of the rich used in the purer ages of christianity, to be open to all; and high and low, rich and poor, met together as members of one family, to enjoy the ingathered fruits of the earth—a custom well suited to remind our Christian forefathers of the second advent of our Lord to gather His dispersed family, and commence that glorious reign shadowed forth by the fabulous one of Saturn. Although the rich do not at the present day thus indiscriminately invite their

* Clavis Calendaria, vol. i., p. 50. † Ibid, vol. ii., p. 194. ‡ Ibid, vol, ii., p. 341.

|| His statue resembled a crowned king, his head encompassed with twelve bright golden stars. Sir Richard Baker's Chronicle of England (1665), p. 3.

neighbours to their mansions, yet it is the custom here for masters to give their apprentices and work-people refreshments on Christmas-eve. It was the practice, also, until within the last three or four years, for the grocers to give their customers amongst the labouring classes the materials for making Christmas cakes. Throughout the Christmas week, the singing of carols is very general; and early in the morning of Christmas-day, long before daybreak, choirs of singers and musicians perform, oftentimes very sweetly, under our windows.

Our Christmas plays, also, are very similar to those of the Saturnalia. The *guise-dancers* (the same as the *guisards* of Scotland) may be always seen in the streets of Penzance in the evenings from Christmas-day to "twelfth day," going to or from the houses wherein they are permitted to perform, attired in fantastic dresses and variously dis*guised*. A well-known character amongst them, about forty years ago, was the hobby-horse—represented by a man carrying a piece of wood in the form of a horse's head and neck, with some contrivance for opening and shutting the mouth with a loud snapping noise, the performer being so covered with a horse-cloth or hide of a horse, as to resemble the animal, whose curvettings, biting, and other motions, he imitated. Some of these "guisedancers" occasionally masked themselves with the ~~heads~~ horns, and skins of bullocks, a practice not yet entirely discontinued.

This masking and acting in imitation of brute creatures appears to be of very high antiquity. The North American Indians have a buffalo dance, and a bear dance wherein the dancers imitate the bellowing, stamping, and other actions of these animals, just as the hobby-horse does the appearance and prancings of the horse. In the buffalo dance the mask worn is "the skin of a buffalo's head with the horns on." It is held annually amongst some of those Indians and "to the strict observance of which they attribute the coming of buffaloes to supply them with food during the season." If, however, the herds should not for any length of time come near their dwellings and a scarcity of food ensue, the dance is renewed and continues with songs and yells, drums and rattles, night and day, sometimes for two or three weeks together without a moment's pause, until the buffaloes make their appearance—then a shout of

thanks goes up to the "great Spirit," to whom, after the hunt, "the choicest pieces of the victims are sacrificed." * In the bear dance, which is held for success in bear hunting, one man takes the lead, having his head and body entirely covered with the skin of a bear. "Many others in the dance wore masks on their faces made of the skins from the bears' heads, and all with the motions of their hands closely imitated the movements of that animal." † This practice of the North American Indians renders it probable that the custom in this neighbourhood of *guisedancing*, or masking and dancing in imitation of brute creatures, was originally of a supplicatory nature, and instituted for imploring the gods to preserve from death and disease, the cattle represented by the dancers. At the summer solstice, when fires could be kindled in the open air, a different method of propitiating the gods was resorted to, as we have already seen.

I will notice only one other Christmas custom observed in this neighbourhood from time immemorial, until within the last thirty or forty years. On the decayed stump of an old tree was painted or carved the figure of a very old man called "Old Father Christmas," identical, perhaps, with "Old Father Saturn." As this senile figure was always burnt on Christmas-eve, the last day of the solstitial year according to the Julian calendar, the ceremony was probably emblematical of the death of the old year. The log, or "Christmas stock," on which the figure was carved lasted throughout the Christmas, and a piece of it was laid aside for lighting the next "Christmas stock." The fires, so indispensable at the solar festivals, form no part of the requirements for that of the moon or those of the stars, although many of the last are held in winter.

In thus describing our four annual festivals at the commencements of the four seasons or quarters of the year, I have not considered them in the order of their succession. That order is very remarkable:—

First,—the festival of the sun—the Nativity, or first advent, of the Sun of Righteousness—in humiliation—the sun low in the horizon.

* Catlin's "North American Indians," vol. i., pp. 127, 157. † Ibid, p. 245.

Next, the festival of the moon—His church—also in humiliation —the bride of the Lamb.

Then the festival of the sun again—the second advent—in glory —the sun at its highest elevation.

Last of all, at the Michaelmas or harvest quarter, the festival of the stars,* or host of heaven, when the church in her services for All Saints' day (the last festival of the ecclesiastical year), reminds her children of the glorious appearance of those who having followed the Lamb in His humiliation, will at His second coming be manifested as the Queen of heaven.†

The festivals of the first two quarters commemorate Christ and His church in their *natural* bodies—those of the last two quarters, Christ and his church in their *spiritual* or resurrection state—*Corpus Christi*—the head with the members—sown a natural body—raised a spiritual body.

Some have thought that the great festivals of the Christian church were fixed on the present days of their observance, for the purpose of displacing the corresponding festivals of the heathen. But Christmas-day‡ was fixed by Pope Julius the First on the 25th of December, simply because the Nativity, after a strict inquiry, was in his time computed (although erroneously) to have occurred on that day—the day of the *winter solstice*. The festival of John the Baptist, who was born about six months before our Saviour, would then have coincided with the *summer solstice*. It is equally evident that the spring and autumn festivals were not designed to displace the heathen festivals of the moon and stars—and it is this apparent absence of all design that renders the coincidences noticed in this Paper so very remarkable.

Penzance, 11th Sept., 1846.

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* Dan. xii. 3.—1 Cor. xv. 41, 42. † Rev. xxi. 9, 10. ‡ See Rees' Cyclopædia—*Christmas.*

Note on a new species of Crustacea allied to Gonoplax rhomboides.

By JONATHAN COUCH, Esq., F.L.S.,

MEMBER OF THE SOCIETY.

MILNE EDWARDS, in the second volume of his Natural History of Crustaceans (p. 62), has given a short description of a species of *Gonoplax*, of which the specific character is, that it is destitute of spines on the external margin of the shield or carapace, close behind the external angles of the orbits. But of the distinction of this from the only other known species of this genus (*G. angulata*), a doubt was entertained by Latreille; who supposed that it was nothing more than a variety; in which opinion he is joined by Mr. Bell, in his beautiful work on Crustaceans, now in the course of publication. And this doubt would appear to be not without reason, if we are guided by the names and references which Dr. Milne Edwards has placed at the bottom of his page. I have no opportunity of consulting the authors there quoted; but some of the specific names are so strikingly inappropriate to this species as I have seen it, that it becomes clear, that some mystery hangs over the subject; and we are left to the choice of the following conclusions:—*First*, that there are other species, yet to be distinguished: *Secondly*, that the *G. rhomboides* has been confounded with its congener in one or other of its sexes, or in some stage of its growth: or *Thirdly*, if they be in reality one species, that a portion of its history is obscure, and that it is more variable in its form, proportions, and armature, at different ages beyond early youth, than any others of our crustaceans are known to be. The length of the carapace, including the anterior process, beneath and on the sides of which the eye-stalks are inserted, of the specimen of *G. rhomboides* under examination, is six lines, the breadth eleven lines; and this is, I believe, about the size they usually attain. But the distinctions

between these crabs, considered as species, will be best expressed by a comparison between them. In doing this, however, I prefer giving a reference to the figure by Pennant (*Cancer angulatus*, vol. iv., pl. 5., fig. 10) rather than to that by Mr. Bell; because the latter, though I have no doubt correct to the specimen, appears not to express adult proportions; but implies at some more advanced period of its growth, a sudden lateral expansion. The arms, however, are of the full dimensions; and the spines and straightness of the anterior border of the carapace, are expressive of the species. My specimen of *G. angulatus* measures one inch and a half across, and three-quarters of an inch in length; which is very nearly the proportion of Pennant's figure; and in this specimen the anterior limb measures rather more than four inches in length. At that portion of the carapace which in *G. angulatus* forms the strong advancing spine that affords the specific designation of Pennant, in *G. rhomboides* there is only a gentle curvature, that makes no approach to the nature of a spine; and there is no appearance of that second lateral spine, of which in its congener there is always a rudiment; and from which Dr. Leach seems to have derived his name, *G. bispinosa;* but which is too powerfully given on the right margin of Pennant's figure. This hinder spine is somewhat strangely omitted on the left side of his specimen. The eye-stalks are more curved, as is also the margin of the carapace that conceals them, than in undoubted specimens of *G. angulatus;* and as they lie hid, the joint is anterior to the ocular portion: a circumstance which induced me, in the Cornish Fauna, to place this species in the genus *Gelasimus*, under the name of *G. Bellii;* in honour of the professor of Natural History in King's College. My past observations of this species having been confined to female specimens, a greater degree of uncertainty has formerly prevailed in my mind concerning this crab; either as regards the distinction of species, or the progress of evolution of its form; for while in a male *G. angulatus* of the dimensions already given, the arms are four inches in length, it is known that the same parts in the female are very much shorter, as well as more feeble, a rule which, indeed, applies to all the species of crustaceans. But my present account is derived from an undoubted male speci-

men of *G. rhomboides;* in which I find their length to be proportionally much shorter than in the kindred species; and their appearance to bear a closer resemblance to the same parts in the female in the other. On the arm, where in *G. angulatus* there is a spine, in this there is a very slight mark of a point; and a portion of the carpus is only membranous: although this last may be a defect confined to the individual. In the interior lengthened portions of the smaller legs of *G. angulatus,* there is on the superior ridge, where it is about to terminate in the tarsus, a small, but well-marked spine; which in the present species is absent, the place being marked by a depression, followed by a rising. Mr. Bell, in his description, says that in the young male of *G. angulatus,* the arms resemble those of the female; and from this circumstance it may be objected that one of the most distinguishing marks of this as a species, will be of less importance. In all other cases, however, I have found that when the flap or tail has distinctly assumed the male form, all the other organs have also adopted their permanent condition. The margin of the carapace may at least be judged to have done so; and yet this, in so large a specimen, preserves the well-marked distinction from the other. If then, the *Gonoplax rhomboides* be allowed to be a distinct species, it must be claimed as scarcely a rare inhabitant of the channel, where the present specimen must have lived at the depth of thirty-six or forty fathoms. If it be otherwise decided, there is room for further research, to discover the progress and proportions of its developement; and whence it happens that it observes a law so very different from that of other British crabs. I have generally failed in obtaining good specimens; for though *G. angulatus* has sometimes come within my reach alive and uninjured, I have only seen this from the stomach of fishes; where usually it has sustained some injury, and most commonly the loss of some of the limbs.

Polperro, November, 1845.

Notice of the occurrence of rare Birds in Cornwall.

By EDWARD HEARLE RODD, Esq.,

ONE OF THE SECRETARIES.

SINCE the last annual meeting of this society we have been very fortunate in detecting the occurrences of several very rare species of British birds, and in two or three instances, of birds new to our Cornish Fauna.

The report which has been just read to the society does not refer to the recent capture, in the county, of an adult specimen of the purple heron, the specimen having been obtained *out* of our immediate neighbourhood. It may, however, be regarded as a rare and valuable British bird, although within the last few years there have been more instances of its occurrence than formerly. It was first added to the Cornish Fauna by Mr. Jonathan Couch, of Polperro, to whom our county is so much indebted for scientific researches in natural history generally, and in one branch of it especially. Mr. Couch received the first Cornish example, it is said from a fisherman, who reported its having alighted on a boat two or three leagues from the shore, in all probability after migration from, or preparing for migration to, Africa, or some of the warmer parts of Europe or Asia, in which countries this species is found permanently resident. I am not aware in what state of plumage the bird was when caught, and the period of the year is not recorded by Mr. Yarrell, to whom Mr. Couch communicated the above fact.

The adult bird exhibits a plumage of extreme beauty and graceful elegance, and as the specimen referred to above is, perhaps, as perfect in the developement of its characters as it possibly

can be, I have thought it would form a subject of interest to the society to exhibit the specimen, both for its own individual beauty, as well as to show the contrast which the immature bird presents in plumage, in both of which characters it may be seen in the case now before the society. The immature bird was obtained from Oxfordshire some years since, and presented to me by a friend, as one of our rarest British birds. It may be right to add, that it is the opinion of our most talented naturalists, that this bird forms an intermediate link, uniting the herons with the bitterns. There appears to be fair ground for favouring this opinion, not only from certain external peculiarities of form, but also from its habits and haunts. The bittern's resorts are almost invariably sedgy morasses, willow plots, and wet rush coverts where the bird lies concealed. The herons, on the contrary, may be found on the banks of open pools, on the sea-shore, neither resorting to such coverts, nor attempting to conceal or hide itself. The purple heron has been generally found in sedgy coverts, amidst flags and reeds, and the bird now before the society was seen alive in a low boggy bottom, and subsequently found dead in the same locality. The toes of the bittern far exceed those of the heron in point of length, actually and proportionately. Those of the purple heron correspond with the bittern very remarkably in this character. The form also of the beak shows a nearer approach to that of the bittern than of the herons. On the other hand the entire absence of the ruff-feathers on the neck (for which character the bittern is remarkable), and the prevalence of the dorsal and occipital plumes in the purple heron, which are never seen in the bittern, and which in all the true herons more or less adorn the perfect bird, show its affinity to the true herons.

Tringa rufescens,—Buff-breasted Tringa.

Since the report for the present year was prepared, I have had the gratification of obtaining a specimen of a very rare British bird, killed on the 3rd Sept., 1845, between Marazion and Penzance, in company with several species of the *Tringa* family, by Lady Carrington's house-steward, who has, from time to time, obtained

several specimens of our rare sea-shore birds. The value of this bird may be estimated, by the present specimen forming another addition to our Cornish Fauna,—no other instance of its occurrence in the county being recorded, and as being the fifth instance only of its occurrence in Great Britain. The bird now under notice is the *Tringa rufescens* of authors, or the buff-breasted sandpiper. Three or four years since, when I was in London, Mr. Yarrell showed me the then only known British killed specimen, which was his property, and which is referred to in his History of British Birds as having been killed in the month of September, 1826. Three others, however, have since come to his knowledge, and the Mount's-bay specimen forms the fifth example recorded. I have taken the liberty of exhibiting this valuable and interesting bird to the society, to enable them to see the peculiarities which distinguish it from other species of the *Tringa* family, to many of which it bears a general resemblance in the tints of its plumage. The bird is preserved and exhibited in a flying attitude, to enable its peculiarities to be observed and recognized without difficulty. The characters above referred to are first, a general buff colour which pervades the whole of the under parts, and secondly, the peculiar markings of the under surface of the wings, which in the quill feathers are elegantly speckled with minute spots on the larger webs, and in the secondaries ending or tapering off abruptly to points bounded by alternate and regular borders of white and dark bands, and which present (especially in adult birds) a regular series of lines, giving an elegantly-variegated appearance, quite peculiar to this species. The present specimen is an immature bird, and corresponds with Mr. Yarrell's in every particular.

Alauda cristata,—Crested Lark.

Another very rare species of British bird has, within the last two days, come to my notice, and which will form another interesting addition to our Mount's-bay and, I may add, Cornish Fauna. This is the crested lark *(Alauda cristata)*, see Gould, pt. 19, a species not uncommon on the opposite shores of France, but not

detected in a wild state in Britain until after the completion of the most recent History of British Birds by Mr. Yarrell. This species, together with some others, since ascertained by that indefatigable naturalist to have occurred in our country, forms the subject of a supplement to his splendid work, on reference to which a figure and description of the species may be seen.

The society is indebted for the discovery of this bird in Cornwall to Mr. W. H. Vingoe, who detected the two now before the society upon a hedge on Marazion Green, where they were shot on the 9th Sept., 1845. His attention was directed to them by the melodious quality of their notes,—resembling more in expression the flute-like tones of the woodlark than the well-known song of our skylark. The form and length of the beak, the shortness of the hind claw, the extended crest on the head, and the yellowish-brown colour of the hinder parts, distinguish it from our common species.

List of Insects (Lepidoptera) *found in the district of the Land's-end.*

By Mr. WILLIAM NOYE,

ASSOCIATE OF THE SOCIETY.

Gonepteryx rhamni	Found in June, but rare, owing, I think, to the scarcity of the shrubs on which the larvæ feeds.
Colias Edusa.....	In June and July, and again in September: some seasons plenty, and in others very rare or not found at all. I think this species hibernates, for the early specimens are always worn
Pontia brassicæ	Common; summer months.
——— *rapæ*.....	Common; from March till October.
——— *napi*	Common; from April till September.
Mancipium cardamines.	In May and June; frequenting low grassy fields and meadows; common.
Melitœa Selene	In May, June, and August, on heathy commons; a variable species.
Argynnis Aglaia	I have never taken but one of this species in this district, and that was in August, 1845.
——— *Paphia*	In June, July, and August; frequenting low fields and meadows.
Vanessa urticæ	Common, almost the year through.
——— *Io*	In August and September; frequenting turnip fields; common.
——— *Atalanta*	In the same months as the preceding; some seasons abundant and in others very rare.

Cynthia Cardui ..... From June till October; frequenting clover fields: this species appears in great numbers some seasons, but in others there is not a single specimen to be found.—It has been abundant this season. This, with the preceding three species, appears early in spring, after having hibernated.

Hipparchia Ægeria.... From April till October; abundant in lanes.

——— *Megæra* ... In April and May, and again in August and September; abundant.

——— *Semele* .... In July and August; on stony commons in profusion.

——— *Iithonus* ... In June, July, and August; very abundant.

——— *Janira* .... Appears about Midsummer, and continues till the end of Aug.; abundant.

——— *Pamphilus* . In May, June, and September; found on heaths; very common.

Lycæna phlæas ..... Found in all the summer months: this active little butterfly is very common.

Polyommatus Alexis ... In April and May, and again in the end of July, August, and September; common in clover fields & meadows: a very variable species.

——— *Argus* ... In June and July. This is rather local in its distribution: I have found it only on the southern cliffs and at the Land's-end, where it occurs in profusion. I took upwards of two hundred specimens in one spot in the beginning of July last.

Pamphila Sylvanus ... In June and July; not rare.

Anthrocera trifolii ..... In June; but not common.

——— *filipendula*.. In July and August; abundant.

Smerinthus occellatus ... Appears in May and June. I have not found this species common.

——— *populi*..... In May, June, and July; common.

Acherontia atropos ..... This, the largest of all our Lepidopterous insects, must be reckoned rather common here; it has occurred from April till Christmas. I got a very fine specimen last April, another in July, and I have several in the pupæ now, and one larvæ still continues to feed on the potatoe leaves. I had brought me, about a fortnight since, a very curious variety of the larvæ: the ground-colour of the first three segments was cream-white, with a broad black stripe on the back; on each of the abdominal segments was a dark cross, thus,— ⋈ ; the oblique stripes on its sides were very indistinct.

The squeaking sound emitted by this species makes it an object of curiosity: the cause of the sound has not yet been discovered. The larvæ also emits a peculiar sound:—when at rest, if touched on the back with the finger dipped in cold water, it gives out a sharp crack. Mr. Couch was the first to point out this peculiarity.

Sphinx convolvuli ..... Appears in August and September. This fine species is not at all rare in this district, but it is too frequently taken by inexperienced hands and gets spoiled: eight or nine have been captured already this season. I have never been so fortunate as to find either the larvæ or pupæ.

——— *ligustri* ..... In June and July; common.

Deilephila livornica .... Two specimens of this rare insect occurred here last April, one of which I was fortunate enough to get.

——— *elpenor*..... In June, in marshy places; rare.

——— *porcellus* .... In June and July; also rare.

Macroglossa stellatarum. This agile little insect is occasionally found during all the summer months in fields and gardens.

Sphecia apiformis ..... In July; not common.

——— ***bembiciformis*** .. In June; rather plentiful.

Hepialus lupulinus .... In May and September; common.

——— ***humuli*** ..... In June; but not common.

——— ***Sylvinus*** ..... In September; rare.

Pygara bucephala ..... Appears in June; but not abundant.

Cerura vinula ..... From April till August; the larvæ found on the poplar in July and August; abundant.

Saturnia pavonia ..... Found in May. I know of only two or three of this species found in this district.

Lasiocampa rubi ..... Found in May and June: the larvæ is found in autumn very abundant, but the perfect insect is not common, the larvæ being difficult to breed.

——— ***trifolii*** .... I have found several larvæ of this rare species on the cliffs in St. Just, and at the Land's-end, but it is difficult to breed: I bred a male and female last season, and two females this. The time of their appearing varies much: those I bred last season came to perfection about the 25th of September, and this season they came out about the 18th of August. I have found several empty cocoons on the heaths along the cliffs, consequently I think it is not rare on this coast.

L. quercus or ***L. roboris***. This is an abundant species; found in August and September. This season I captured about forty males, attracted by two bred females, and might have taken a great many more, for they came in swarms: there were as many with the yellow patch at the base of the wings as there were without it, consequently I think L. quercus and L. roboris are varieties of the same species.

Clisiocampa neustria ... Appears in July; but not common.

Odonestis potatoria	In June and July; found in moors and low grassy fields; not rare.
Orgyia antiqua.....	In July and August; common.
Euthemonia russula	In June. I have not heard of but one of this species found here.
Arctia caja	Found in June and July. This is a very common species.
Phragmatobia fuliginosa	In June and July; not common.
Spilosoma menthrasti ...	Appears in May, June, and July; not rare.
——— *lubricepeda* ..	In June; more rare than the preceding.
Nudaria mundana.....	Found in June and July.
Callimorpha jacobæ....	In May and June; common: the larvæ found in abundance on the groundsel in July.

At some future time I shall gladly continue this list to the *Noctuidæ*, &c., and supply any that may be discovered belonging to the preceding orders; for I doubt not that many such will occur, the district being as yet but very imperfectly examined.

August 27th, 1846.

Notice of the Capture of two rare British Fishes in Mount's Bay.

By RICHARD Q. COUCH, M.R.C.S.,

ONE OF THE SECRETARIES.

VERY few communications on the subject of ichthyology having been made to the society, I am induced to bring to its notice the capture of two very rare British fishes, within the province of our researches.

Long-finned Tunny, *Orcynus ala longa*. (Cuv.) Two specimens of this fish have been taken in Mount's Bay in a mackerel seine. One is in our museum, this was caught several years since; the other was caught during the present summer, and from which the following description is taken. It is eighteen inches long, and five at its greatest depth: its colour is a bluish black, or deep mackerel tint, and plain above, fading below into a pale blue, yellow, and white. The shape resembles the bonito. The eye is large and placed over the angle of the mouth: the mouth is rather small, gill-covers smooth. Immediately behind the gill-covers, and below and around the origin of the pectoral fin, and along its upper margin, extends a corslet, forming a sulcus into which the pectoral fin falls; it rises also to the back and extends to the second dorsal fin. The pectoral fin is large and long, and extends from immediately behind the gill-covers to the posterior margin of the second dorsal. The first dorsal fin is spinous, and arises on a line posterior to the origin of the pectoral; the first four rays are the longest the fifth, sixth, seventh, eighth, and ninth gradually decrease in length, and the rest are of equal length. The second dorsal is soft and crescentic posteriorly, vanishing into the finlets. The ventrals are, first spinous, and the rest soft. The ventrals of

both sides closely approximate, and lie on a scale around which is a furrow or sulcus, and between them are four false rays. The caudal fin is crescentic and large. The abdominal, like the second dorsal, is crescentic, and disappears posteriorly into the finlets between it and the tail. The fin-rays are, P. 37; D. 14+15; V. 6; Ab. 13; C. 40; fin $\frac{7}{8}$. This specimen was caught while fishing for mackerel, and, considering its size, exhibited extraordinary strength. Of its habits I could discover but little, but its Mediterranean history is much like that of the bonito. The gape is small: the lower jaw is much longer than the upper, and both are furnished with a single row of small, sharp, and incurved teeth. The two specimens here recorded are, I believe, the only instances of its being found on the British shores.

The second species to which I refer is the Torpedo, or Electric Ray. During the past year, I have been fortunate enough to have had opportunities of examining four specimens of this fish out of five which have from time to time been taken off the east end of Mousehole Island.

Mr. Yarrell, in the first edition of his work on British Fishes, does not distinctly mention the species found on our shores, but says,—"the point is not yet satisfactorily ascertained;" and he at the same time expresses a hope that all observers on the coast will unite to ascertain the character of the species inhabiting our seas. In furtherance of these views, the subject is brought before this society. The general form of all the specimens was circular, but irregularly elongated posteriorly. The front margin is waved; the snout just apparent and situated in a depression, from which there is a horizontal undulation on either side.

The specimen selected for description measures 3 feet 3 inches from the snout to the end of the tail; in its greatest breadth 2 feet $2\frac{1}{2}$ inches; length of the tail $8\frac{1}{2}$ inches. The colour varied in the different specimens, but the general tint was of a darkish purple, or neutral tint, clouded, but without spots. The eyes are small, $\frac{24}{10}$ inches apart, and about 3 inches from the snout: the temporal orifices are crescentic in form, larger than the eyes, behind which they are situated; they converge posteriorly and have plain margins. Dorsal fins, two, near the caudal; the anterior one is the

largest,—it is 2 inches wide at its base and round on its free border, and when it lies on one side it falls exactly on the edge of the posterior lobe of the body: the posterior one is about 2½ inches from the root of the caudal fin, and is 1 and 1-10th of an inch wide at its base. The caudal fin is large, being about 8 inches in its transverse diameter. The body is very thick, fleshy, solid, and composed of two portions or lobes on each side, the largest being the most anterior. The skin is smooth and slimey. The under surface is white, uneven, and variegated with deep pink. The mouth is small, crescentic, 2½ inches from angle to angle: teeth small, numerous, and conical.

Compared with Mr. Yarrells figure, all the specimens examined were wider in proportion to the length, and the form of the pectoral fins more irregular. The eyes are smaller; the temporal orifices closer to the eyes, semilunar and not fringed. The snout is more distinct than is there represented. Our species proves not to be the *Torpedo vulgaris* figured by him in his first edition; but the new British torpedo, *T. nobiliano*, which is described and figured in the second edition of the British Fishes.

Six specimens are now known to have been taken in Mount's Bay, one of which is preserved in our museum.

On a new muscle discovered in the eye of Fishes.

By R. Q. COUCH, M.R.C.S.

THIS Paper contains a description of a muscle situated in the interior of the eye of fishes, which arises from the edge of the sclerotic, and is inserted into the inferior circumference of the crystalline lens; its object appears to be to alter the focus of vision. The Author named it *Motor lentis:* but as the communication is an anatomical one, this abstract of it only is given.

Account of the capture, in Cornwall, of the Six-branchial or Gray Shark; but lately recognized in the British Fauna.

By J. COUCH, Esq., F.L.S., &c.

MEMBER OF THE SOCIETY.

ON the 19th of February of the present year (1846), there was caught by a fisherman of Polperro, and immediately brought to me, a specimen of a fish, which I recognized as the Six-branchial or Gray Shark; a species new to the Fauna of Cornwall, and until lately, to Britain. Beside the advantage of making a record of the occurrence of every novelty in natural history, as neither any precise description of this species, nor a figure, is to be found in any work that is easily accessible, I have much pleasure in communicating the particulars derived from this capture to the society.

The length of this specimen was 2 feet 2½ inches; the head wide, and level over the summit; the breadth, from eye to eye, 2¾ inches; the snout rounded in front, and somewhat thick; eye large, staring, and slightly oval; without an angle on the anterior portion, or inner canthus, and destitute of a nictitant membrane. This portion of the eye is immediately over the symphysis of the lower jaw. The larger nostril is half way between the eye and snout, inclosed by a prominent margin, the orifice directed forward. Temporal orifice small, 1½ inch from the posterior angle of the eye. The gape very large; tongue bound down, and not apparent; teeth, in the upper jaw, eight on each side, thin at the base, the points slender and sharp, not serrated, their direction towards the angle of the mouth. A small vacancy at the symphysis of this jaw; and a little in advance of this are four teeth, the two middle

ones being very slender and parallel, the points directed towards the mouth; the other two more remote, and their points diverging. A little in advance of these are other two that might easily escape observation, slender, smaller, and more loosely attached. As in the upper jaw, so in the lower, there is a single row of teeth, but they differ greatly in form, being thin and broad, their anterior margin higher, the sloping edge finely serrated; they are six in number on each side of the symphysis, with what appears like a small bifid intermediate one. Orifices of the gills six, closely approximate; the apertures long and encircling the throat. The pectoral fins wide, triangular. Body with the general proportions of the Picked dog-fish; the head wider and larger. Dorsal fin single, its anterior edge 14 inches from the snout, and opposite the space between the ventrals and anal, it is larger than the latter. Caudal fin 6½ inches long, and consequently more than one-fourth of the length of the fish, and longer as well as more slender than that of any other British shark, except *Squalus vulpes*. The inferior lobe of this fin is falcate, and becoming attenuated as it proceeds, being narrowest opposite the notch. Along the posterior two-thirds of the upper margin of the tail is a row of spines, of three series, closely pressed together at the roots, and the two outmost regularly diverging. Texture of the skin rough when felt against the grain. Colour, blackish-brown on the back, and pectoral, dorsal, and caudal fins; reddish-gray on the sides; white beneath. Lateral line pale, bent suddenly down at the falcate portion of the tail. Conjunctiva of the eye bluish-white, the pupil large and black. A male; the claspers small. It was taken with a line, at the distance of about three miles from land, and seemed at the time to be feeding on pilchards.

This species appears to have been unknown to the older naturalists, since I have sought for it in vain in the works of Rondeletius, Gesner, Ray, and Ruysch; and it is not included in the tenth edition of Linnæus's System of Nature, though it is recognized in Turton's translation of Gmelin's edition of the same work, under the name of *Squalus griseus*. It is there represented as growing to the length of 2½ feet; but though this differs so little from the size of the Cornish specimen, it is clear, from the additional teeth

specified by Turton, that the latter must be decidedly a younger individual. A specimen, the first, and only other that has been taken in Britain, was caught with a line, off Ventnor, in the Isle of Wight, in November, 1845, which measured little less than 11 feet in length; and Risso (Ichthyologie de Nice) describes the fish in terms which can signify nothing less than these full proportions. In the specimen referred to by Turton, there was only one row of teeth in the upper jaw, but there were "many rows" in the lower; and therefore we may judge that it is about this period of its growth that the evolution of dentition begins to show itself, and first in the lower jaw. I could discern no more than one row in each jaw, in the specimen I have described. Risso assigns three rows of triangular sharp-pointed teeth to the upper jaw, and to the lower, five; and he adds, that the central inferior teeth are sharp and conical; by which I understand him to say, that at the symphysis, between the lateral arrangements of flat serrated teeth, he made out two or more of what I had supposed to be a single bifid tooth. It is probable he is correct; but they are pressed closely together, and erect; so that in my specimen their true nature could not have been ascertained without some degree of mutilation. By Rafinesque, and subsequently by Muller and Henlé, this species has been constituted the type of a separate genus, under the name of *Hexanchus:* one of the chief marks of which is, that contrary to by far the largest number of the family of sharks, it is furnished with six branchial orifices, and of which genus it is the only known species.

By Cuvier it is named *Notidanus;* and he classes in the same genus a couple of others, that are marked by the occurrence of seven branchial orifices; on which account the latter have been formed into the genus *Heptanchus* by the two above-named German naturalists. It is more easy to raise objections to any proposed arrangement of this family of fishes, than to form a new one; and at least a more extensive acquaintance with the species must be obtained, before a classification can be made that will stand the test of close inquiry, as a natural series. Cuvier has remarked, that though the teeth of this fish have been well figured, the fish itself is nowhere well represented. But he is wanting in his usual

accuracy when he adds, that it differs from *Galeus* only in the absence of the first dorsal fin; for beside the greater width of the head, which is a sign of less activity; and the different form of the teeth, that leads to a different mode of feeding; the much superior length of the tail, and the singular ridge or spines along its superior margin, which must be employed in a different mode of defence, and which assimilates it to the black-mouthed dog-fish (*Scyllium melanostomum*), are quite sufficient to show it widely distinct. In this last particular, indeed, it approaches the genus *Pristiurus* of Muller and Henlé, while its snout bears an intermediate character between it and the genus *Scyllium*; so that it is equally allied, and yet equally distinct from either of them. In its habits it is undoubtedly a ground shark; and Risso says that it keeps in very deep water in the Mediterranean, in some parts of which it is said to be not uncommon, though Swainson never met with it during six years that he resided in Sicily. The ground sharks, with us, are very inactive; and the fisherman who caught this fish informed me, that it scarcely moved after it was taken into the boat.

On the two great Thunder-storms, with Extraordinary Agitations of the Sea, in 1846.

By RICHARD EDMONDS, Jun., Esq.

EXTRAORDINARY oscillations of the sea occurred in Mount's-bay on the 5th of July and the 1st of August, 1846, the days of two very severe and extensive thunder-storms.

The oscillation of 5th July was observed at Marazion at half-past four in the morning—immediately after a terrific thunder-storm; the tide being about four hours ebb. One of the persons who witnessed the extraordinary motion of the water said, "the sea seemed as if it had been struck by the lightning." It was observed at Penzance and Newlyn between six and seven the same morning, when the attention of a fisherman in the latter place was arrested by seeing the bows of the boats, moored near the shore, not as usual facing the wind (then about N.), but turned against a current, moving alternately N. and S. Boats which the tide had quitted, in Penzance, St. Michael's Mount, and Newlyn, were again floated and left dry—the rise and fall being between 3 and 4 feet. The interval from the commencement of one influx to that of the next was about fifteen minutes. The flux and reflux were greatest in Penzance Pier, but were observed there only once, whereas at Marazion and Newlyn they were noticed two or three times successively.

The great storm which passed through Britain on this day raged on the Atlantic in the night of the 4th, much distant lightning from the S. and S.W. having been then seen in Mount's-bay, which continued until between 3 and 4 a.m. of the 5th, when the fierce lightning and thunder burst forth from every part of the heavens. As the storm proceeded throughout Cornwall, towards the E. and N.E. it grew very alarming & destructive. It reached Exeter between 8 and 9 a.m., Windsor between 2 and 3 p.m., and London

at half-past 3 p.m.* In its progress northward, it was felt throughout Somersetshire between 8 and 10 a.m.; at Leeds about 3¼ p.m.; at Penrith, Dumfries, Ayr, and Glasgow, between 3½ and 4 p.m.; at Edinburgh between 5 and 6 p.m.; and at Dundee and in Argyleshire about 7 p.m. Thus the storm, as it advanced from Mount's-bay towards the north, moved much swifter than it did towards the east.

In many places the lightning and thunder were incessant during most of the storm. A whirling, fitful, "wild kind of wind" accompanied it, with heavy rain or hail, the hailstones in different places in Cumberland being 2, 3, and even 4 inches in circumference. At Ayr and Maybole it was preceded by a whirlwind of remarkable violence. At Walsall a whirlwind tore up trees by the roots. At Boston, in Lincolnshire, the hail and rain were accompanied with a tremendous wind.

The temperature on this day was unusually high, not only in most parts of England, but on the Continent. The thermometer at Chiswick was 95°; at Boston, 90° ("the hottest day since 31st July, 1826"); and at Paris, 97¼°.

Before the storm commenced in Kent, a large flight of butterflies completed its passage from France to England. For many hundreds of yards it quite obscured the sun. "During the passage the weather was calm and sunny, but an hour or so after they reached *terra firma*, it came on to blow great guns from the S W., the direction whence the insects came.*

The storm now described was not felt in London and on the eastern coast of Britain so severely as on the western; but the storm of the 1st of August following, which visited the metropolis and its neighbourhood, was more terrible than any there since 18th May, 1809. It commenced at 3h. 20m. p.m. In the Meteorological Report from Greenwich Observatory it is stated, that at Lewisham the hailstones "were nearly all as large as pigeons' eggs." It was felt severely the same evening at East Walden, Leicester, and Nottingham, and before midnight at Southampton and Paris. About 4 a.m. of this day an extraordinary agitation

* In the *Journal des Debats* was the following communication from Havre, dated 6th July: "Yesterday, at 5 p.m., a violent storm suddenly rose from the west, and still continues unabated."

of the sea was observed in Penzance Pier by the labourers employed there, and by my informant who was superintending them —the tide being about 5 hours ebb, and the sea very calm. The water suddenly returned towards the shore, rising between 1 and 2 feet, and after an apparent pause rushed back "like a river" to its former level. The influx and reflux, which were observed only once, occupied about six minutes including the time the water appeared to be stationary.

In London, the thermometer on this day was 89½° in the shade and 116° in the sun (the latter the maximum for the year), and throughout the previous night it did not descend below 70°. At Paris, it was 90° a great part of the day. At Penzance, the nights of the 29th, 30th, and 31st of July were the warmest of the year. Early in the morning of the 30th, a terrific thunder-storm, with heavy rain and hail, occurred in Mount's-bay, and throughout Cornwall, and about the same time in Wales and Cumberland; an earthquake having also occurred along the Rhine on the evening of the 29th; from which day, until after the great storm of 1st August, the atmosphere in Cornwall, London, and probably throughout England, was not only very sultry, but highly charged with electricity, whilst violent thunder-storms were experienced in various places.

The oscillations of the sea in different parts of Britain during the great thunder-storm of 5th July, 1843 (exactly three years prior to that first described), were observed—in Mount's-bay, at 11h. 30m. a.m.; at Falmouth, between 1 and 2 p.m.; at Plymouth, about 11 a.m. (an hour after the barometer had reached its minimum); at, Bristol, about 2 p.m. (the barometer being at or near its minimum); at Dunbar, a little after 6 p.m.; at North Berwick, between 1 and 2 p.m. (and twice afterwards on the same day); at Arbroath, at 5 p.m. (where the oscillation continued during a calm and throughout the thunder-storm there between 7 and 9 p.m.); and at the Orkneys, at 3 o'clock of the following morning, at or about the time of much thunder and rain. The thunder-storm during which these agitations happened, commenced near the Lizard about 5 a.m., and in its progress *northward* attained its greatest violence—at Gloucester, between 3 and 5 p.m. (the

hailstones in that neighbourhood measured 3½ inches in circumference); at Birmingham, at 5h. 15m. p.m.; in Liverpool, between 5½ and 6 p.m.; at Norton, Sheffield, and Dumfries, between 6 and 7 p.m.; in Edinburgh, at 7h. 20m. p.m.; at North Berwick, at 7h. 40m. p.m.; at Newcastle, between 8 and 9; and at Kinnaird's Head (seventy miles north of Aberdeen), at 9h. 45m. p.m. In its course *eastward*, the barometer reached its minimum — in Plymouth, about 10 a.m., and at Greenwich, at 6 p.m.* This storm, therefore, like that of July, 1846, advanced northward more rapidly than towards the east. Like that, too, it was in most places attended with violent wind; although at Glasgow, where it arrived about 7 p.m., there was no gale at all, as was the case also in Mount's-bay, where no gale came on for several hours after the thunder-storm. The temperature on 5th July, 1843, was also very high throughout England: at Brighton and Chiswick it was at its maximum for the year.

I have elsewhere† endeavoured to shew how an oscillation of the sea might be produced by a simple shock or vibration of the earth under it, without the upheaving or displacement of any portion of the bed of the sea; and that submarine shocks are probably more frequent than those on dry land. It can also be shewn that the thunder-storms and excessive minima of the barometer, so common in earthquakes, are equally common during these oscillations.‡ In fact, all the recorded agitations of the sea in Cornwall‖ have happened on the days of great earthquakes or thunder-storms, with the exception of that of October, 1843, which however took place during a very considerable minimum of the barometer. An intimate connexion is thus apparently established between thunder-storms, earthshocks, and extraordinary oscillations of the sea. Now, as the oscillations of 5th July, 1843, and 5th July, 1846, were similar to those throughout Europe at

* The storms and oscillations of 5th July, 1843, are very fully described by Mr. Milne in the Edinburgh Transactions, vol. xv., pp. 609-638, from whence I have gathered most of the above particulars.

† Trans. of Royal Geol. Soc. of Cornwall, 1843, p. 117, and 1844, p. 198.

‡ Idem, 1844. p. 198.

‖ Their dates are,—1st Nov., 1755, 31st March and 28th July, 1761, 5th July and 30th Oct., 1843, and 5th July and 1st Aug., 1846.

the time of the earthquake at Lisbon, they may naturally be supposed to have proceeded from similar causes; and as we know that on the day of that great earthquake shocks were actually felt in this island at the very time when some of the oscillations were occurring on our coasts, and as, on either occasion, the oscillations, with few exceptions, arrived at different places at times corresponding, in some degree, to their respective distances from the centre where they were considered to have originated,* it may I think be reasonably inferred that they resulted from local submarine shocks occurring progressively as the highly electrified state of the earth, or air, or both, spread itself from such centre. That some seaports experienced no agitations, whilst others experienced them at periods not accordant with the general rate of progress, is a circumstance rather favourable than otherwise to this hypothesis, since it is analogous to the known phenomena of thunder-storms.

The interval between the two agitations of the sea of 5th July and 1st August, 1846, is, within eighteen hours, the same as that between the last two earthquakes in London, on the 8th February and the 8th March, 1750.

Philosophical Transactions, 1760, p. 566.

PROCEEDINGS OF THE GENERAL MEETING

OF THE

Antiquarian & Natural History Society

OF PENZANCE,

HELD IN THE TOWN COUNCIL ROOM, 17TH OF SEPT., 1847.

In consequence of the death of the President, J. PAYNTER, Esq., J. J. A. BOASE, Esq., occupied the Chair.

Mr. Boase remarked that as it had been the pleasure of the Meeting to place him in the chair, vacant by the death of John Paynter, Esq., he would endeavour to fill the office to the best of his abilities. After some further remarks he called on Mr. E. H. Rodd to read the Report.

The Report having been read, *it was resolved,* on the motion of Mr. Pearce, seconded by the Rev. M. N. Peters,—That the Report be adopted.

The following gentlemen were elected the officers for the ensuing year:—

President.

Joseph Carne, Esq., F.R.S.

Vice-Presidents.

J. J. A. Boase, Esq.	S. Borlase, Esq.
R. Pearce, Esq.	Rev. M. N. Peters.

Council.

J. Batten, Esq.	J. Flamank, Esq.	Col. Robyns.
J. S. Bedford, Esq.	J. Pentreath, Esq.	J. Trembath, Esq.
T. S. Bolitho, Esq.	Rev. C. Moore.	J. Pope Vibert, Esq.

Treasurer.

Richard Long, Esq.

Secretaries.

E. H. Rodd, Esq. | J. N. R. Millett, Esq. | R. Q. Couch, Esq.

DONATIONS TO THE SOCIETY

FOR 1847.

DONORS.	SPECIMENS.
Dr. Millett, *Hayle*	Death's-head moth; Stormy Petrel.
Mr. Symons	Death's-head moth.
Miss Willcock	Coral from Cuba.
Master Tracy Millett	Vampire bat.
The Society	Locust, caught in Penzance.
Mr. Bazely, *St. Ives*	Grossbeak.
Lieut. Col. Ley	Chinese coins.
Mr. W. Bolitho	Egg of heron.
Miss Jane Martyn.....	Five copper coins.
Mr. J. J. A. Boase	Thirty ancient Greek coins; Fifty Roman coins; glass silk.
Mr. Campbell	Flying-fish.
Mrs. Potter	Metallic hand, dug up in Penzance; a silver coin of the United States.
Miss E. Ford	Two copper coins.
Mr. Colenso, *Scilly*	Holuthuria.
Misses Millett	Models of Chûn and Lanyon Quoits, and Men-an-Tol, in Madron.
Royal Institution of Cornwall ..	27th Annual Report.
Mr. L. W. Dellwyn	Hortus Collinsonianus; ——— Malabaricas.
Master S. Higgs	Centipede; Death's-head moth.
Mr. J. Pope Vibert	Silver hurling ball.

REPORT.

AT the close of another year, the Council has still to report the continued activity of the society in the various departments of science which it was designed to pursue: indeed, so great has been the activity of late, that the council regrets that it cannot find room in the present museum for all the objects of natural history or antiquarianism offered for its acceptance. But this, while it is a source of present regret, the council hopes will be a stimulus to greater exertions for increased accommodation. The council would impress this upon the attention of the members of the society, if they desire its labours to be continued.

The council reports with pleasure on the additions to the museum which have been made during the past year in the antiquarian department. Three valuable and beautiful models have been presented to the museum by two ladies, members of the society; and the council has the satisfaction to announce that these labours will be continued during the next year: they are made to scale, and offer accurate representations of the objects they are intended to represent. The space that can at present be devoted to them in the museum is but very small; and when the council observes that our land and fresh-water shells, marine shells, crustacea, zoophytes, and fish are waiting for our collection only till sufficient space can

be obtained, it hopes that no further argument is necessary to enforce the necessity of steps being taken to effect so desirable an object.

In the ornithological department of our society, several interesting discoveries of rare species of British birds have been made, some of which were before unknown, not only to this district, but to the county: amongst them may be named Schinz's tringa, the ivory gull, and the scops-eared owl. The avocet, a very rare Cornish bird, has within the past month been captured in the neighbourhood of the Land's-end. At the same time that it is gratifying to record the above interesting captures, it is to be regretted that we have been deprived of many valuable services which we formerly were able to avail ourselves of in this department of our society, by the absence of one of our late secretaries, Mr. Mitchell, and by the attention of Mr. Vingoe having been almost exclusively diverted to scientific discoveries in mechanism. The council may refer with regret to the loss of such services; for after the discoveries in the past year, which have been made with comparatively little attention, in a locality so admirably adapted, from its peninsular and extreme westerly position, to command success, there can be no doubt but that by a continuation of their zeal our museum would contain most of our rare British birds. Amongst other rare kinds referred to in former Reports, the council has been apprized of the capture, during the past year, of several examples of the fire-crested wren, in the neighbourhood of Truro. The last winter, though remarkable for its severity, and for unexampled duration, did not bring us any interesting varieties of wild fowl.

While no new fish have been added to our list during the past year, yet the habits of those most important to the county, in a mercantile point of view, have been carefully observed. As a commencement to the publication of such observations, the council would draw the attention of the members to a Paper on the Migration of the Pilchard, read at one of our monthly meetings. This we hope will be followed by others. Since our last meeting several new shells have been added to the list of our district by the

labours of our society. Among the *Crustacea* the society has been equally active, and has had the good fortune to add five new species to the list of our district, three of which are new to the county: and the council has still further the satisfaction to observe, that the metamorphoses of the crustaceans, advocated by one of its members, have been confirmed by researches carried on in Mount's Bay.

Mr. Noye has continued his exertions among the insects during the past year, and several valuable additions to our *Fauna* have been made by him.

During the past year the society has suffered very severely from the deaths of several of its most valuable members. The first is that of our indefatigable president, John Paynter, Esq., and his loss was more severely felt from the suddenness with which it came. He was the first and only president our society has ever had. From the time of our institution in 1839, till the time of his decease, he laboured constantly for our welfare; his attendance at our meetings was never interrupted except by his magisterial duties or his absence from this county; but his punctuality must have been observed by all. He devoted much attention to every thing likely to further the objects of our society, as well as to the minutiæ of its internal arrangements: nothing of interest could occur within his influence without its being submitted to the attention of the council. He presided at a meeting but a few days before his death. The council cannot, therefore, do otherwise than record its high sense of the value of his services, and its sincere regret at his decease.

The council would also record the decease of the Rev. John Buller, who had on more than one occasion filled the office of vice-president. He did not for several years take any active part in our proceedings, but he always expressed himself as desirous of our prosperity.

It is with regret that the council has also to announce the death of Mr. Alfred Greenwood, of Chelmsford in Essex, one of our corresponding members. He had been but recently elected, but his valuable communication on the Mosses of Penwith, published

in our last Report, is sufficient to tell us what would have been the value of his future services.

While, however we must regret the loss of our associates in the pursuits of our society, the council still hopes that its interest will be kept up by the increased activity of its remaining members.

EDWARD HEARLE RODD,
J. N. R. MILLETT,
R. Q. COUCH,
} *Secretaries and Curators.*

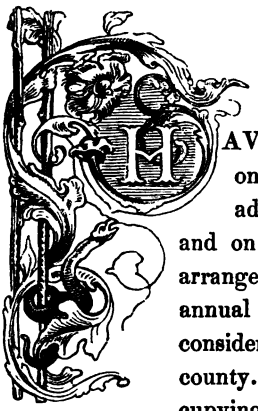
Sept. 17th, 1847.

Observations on the Botany and Zoology of Cornwall,

DELIVERED BEFORE THE SOCIETY AT ITS ANNUAL MEETING:

By RICHARD Q. COUCH, Esq.,

ONE OF THE SECRETARIES.



AVING on former occasions briefly remarked on the system which Nature seems to have adopted in the formation of her productions, and on the order and skill with which she has arranged them, I would, on this the return of our annual assembly, apply, or rather extend, the same considerations to the productions of our own county. We have seen that distant countries, occupying similar climatic positions, are clothed with similar, and frequently identical, vegetation; and that they are peopled with similarly constituted creatures. But we must also have observed that some districts are occupied by creatures peculiar to them, for which neither climatic nor geological changes can account. New South Wales, with its marsupial quadrupeds and concentration of all the strange diversities of form which render it isolated from every other portion of our globe;—the Gallipagos Islands, described by Darwin, abounding with turtles, and possessing only one species of gull, which differs from those of the neighbouring groups; are problems, which have not yet received the slightest elucidation, nor will they till the zoology of the whole earth has been carefully examined. The labour necessary to carry out this investigation is great: so great, that it may deter us from entering on the subject, or, having begun it, induce us to resign

it in despair; yet, by the united energies of societies such as our own, carried on only in our own colonies, the difficulties would soon disappear. It is an investigation requiring all our energies; for it is a labour of minute and continued observation, which few feel inclined to pursue. It is always much easier to dilate into vague generalities than to descend to the close investigation of particulars; hence many of our philosophers possess such expanded views of creation, and comprehensive ideas on the grand lines of Nature, that they even think it beneath their station to examine the component parts of which all great masses are formed. But, great as the task may be, it must be encountered; for we shall never have reason to admire the knowledge of any man, who in his contemplation of those great generalities, neglects the particulars of which they are composed. Having previously shown the remarkable identity in some of the species, both of plants and animals, inhabiting different portions of our globe, it is necessary, on the present occasion, to view the opposite side, and notice the diversities that continually occur.

In referring to the distribution of plants, De Candolle remarks, that out of 2,891 species of flowering plants found in the United States, there are 385 found in temperate Europe; and our own botanist Brown, in his work on the botany of South Australia, says that out of 4,100 species of plants discovered in that country, there are 166 of the species found in Europe. In countries so widely separated, the wonder is that any interchange should take place, and not that it should be so slight. We might at first suppose that the expanse of waters between these countries might be the cause of so small a diffusion of species: but this, however, cannot be the only cause, since the ascertained botany of China, Russia, Palestine, and the shores of the Mediterranean are equally distinct, though the land communication is uninterrupted. It is impossible on the present occasion more minutely to refer to the botanical provinces of De Candolle; for though as a whole they are well defined, and especially so since they have been re-examined by his son; yet they present so much of identity with other and distant countries, and yet so much diversity, as to indicate that their present distribution is not original, but the result of a complicated series of

changes to which our globe has been subjected from its earliest age. Many reflections naturally arise in the mind on the contemplation of such facts which but a few years since it would have been thought dangerous to entertain. It may be asked whether all creatures, *sui generis*, sprung from a single pair? and, if so, how could they be so extensively and irregularly distributed, as at present, without a vestige of any intermediate communication? Why are some, in a living state, confined to circumscribed localities, while, in a fossil condition, they possessed a more extensive range? Are all creatures, now living, the produce of that creation which belongs to the historic era? or, are some of them the living monuments of a previous state? These questions can be asked, and even answered in the affirmative, with perfect confidence in the records of the Bible: it is a subject, however, into which it is not our province to enter. The flora of the Azores is in a great measure confined to them; but they possess some plants common also to Madeira, Teneriffe, and Western Europe: and the flora of West Cornwall possesses a similarity to that of the South of Ireland and Western Europe. In countries washed by the ocean, and not distantly removed from each other, a great interchange of productions may easily be imagined, but not so in widely separated regions; and yet Mr. Brown observes, that of 600 plants collected at Zaire, in Africa, 13 at least were found on the opposite shores of Brazil and Guiana. In our own district, which is surrounded almost entirely by water and removed from any great facilities for the easy interchange of species by land communication, the natural history partakes very much of a marine character, and hence it is placed, in a great measure, beyond our means of observation. Our inland districts are also, to a very great extent, barren and unfruitful wastes, offering but little enticement to the researches of the student. But though we may not be indulged with a tropical luxuriance, yet we should always bear in mind, that no spot is too barren for the productions of Nature; every locality has its own peculiar characteristics, and the apparent waste will yield its harvest as certainly as the most favoured spot. The air, the earth, the water, teem with productions fitted for their stations; even the very scum of our stagnant pools has, by the investi-

gations of Ralfs, assumed beauty and order. What seems to us mere filth, has yielded to his research, forms, which are not only interesting in themselves, but doubly so from the great resemblances they bear to the extinct occupiers of a former state of our globe: this being the case, we need not be at a loss for subjects for research. Some of the species examined by him have been detected in North America, while each country possesses others peculiar to itself. So it is with our birds, which are now tolerably accurately ascertained. Europe, though smaller than North America, is richer in its ornithology. From the labours of Lucien Buonaparte, it appears that there are about thirty-six families of birds in Europe, and thirty-four in North America: of these, Europe possesses four not found across the waters, and America two not found in Europe; so that thirty-two families are common to each. But, though the families are thus common, there is a greater diversity in the number of the species. Of the 503 species found in Europe, one hundred only are common to it and America; and of the 471 kinds inhabiting North America, 371 are not found in Europe. But mere numerical detail will afford us little information on the causes of distribution, unless it be associated with descriptions of habit, and the character of the district to which they belong. The minute habits of a creature may yield a key to more general phenomena. It is a well known fact that many of the birds of our own district, at different seasons of the year, perform short or partial migrations; now, if all the causes producing these movements could be ascertained, some clue might be afforded, whereby the distant migrations of the swallow could be explained.

We do not abound with quadrupeds, and those that we have are but of minor importance; and yet their habits are highly interesting, and such as are not often noticed in books. The common rat, the stoat, and weasel, annually change their habitations; for this purpose they assemble in flocks, and, regardless of every obstacle, accomplish their design; but, as these movements are performed during the night, they escape general attention.

The character of a country, whether hill, or vale, or plain, barren, or clothed with wood, very materially affects the nature of

these movements; which are still more modified by the agency of man. Though we cannot eradicate, we yet can influence all these phenomena; and hence, as the cultivation of a country advances, the creatures occupying the spot gradually retire, from an inability to move as Nature has directed. It seems strange that so much order should prevail where every opportunity is offered for irregularity and confusion, and where no causes are apparent, at all fitted for the least developement of design.

The ocean, where things that own not man's dominion dwell, teeming with its millions, and offering boundless opportunities to unlimited wanderings, even for the weakest of its inhabitants, is yet regulated by laws, as stringent as any other department of Nature. Fish, vagrant in their natures, and seemingly guided by insatiable appetites, or accident, with no mechanical obstructions to the extent of their migrations, are limited to their spheres, and are as observant of times and seasons as man himself: they are lawless only to man's authority. The pilchard, a fish peculiarly a Cornish one, is a well known instance of this. It is true, that they are frequently found in shoals on the southern shores of Ireland,—that they have been seen on the coasts of France, as well as those of Spain, and that they have occasionally wandered to the Straits of Dover; yet these points must be looked on, not as their usual haunts, but as the boundaries of their sphere, the centre of which is the western and southern shores of Cornwall. Year after year its migrations possess the same characters, modified by the state of the tides and the character of the weather. Solitary, in winter, it retires into deep water and feeds quietly near the ground; on the approach of spring its migratory feelings begin; a few associate together, and these meeting with others similarly actuated, unite. As summer advances, company after company thus congregate, till the great autumnal shoals are formed. In their movements they are first irregular, but afterwards gradually assume a westerly course; but when the migratory feeling is fully established, the great mass moves in a northerly direction to the entrance of the St. George's Channel, and it is in this movement that they approach the Irish coasts. Ascending to their northern limits, they return to the south, and visit the Cornish shores. If they approach the land to the

north of Cape Cornwall, a portion passes up to St. Ives, and constitutes its summer fishery; while the mass passes to the south, and into Mount's-bay. The variations from this plan, constituting the irregularities of the fishery, may in a great measure be accounted for, by ascertaining the point of the shores they first approach. The cause of these migrations has in a great measure eluded our researches, but when we remember that the movements of the swallow have received no elucidation from the labours of our numerous observers, this will excite no surprise.

The habits of the herring are similar. The fanciful descriptions of Pennant, of their retiring in winter to the Arctic Sea, of their movements to the south, and their subsequent divisions and subdivisions on the Irish and Scottish shores, are for ever exploded. The Arctic Ocean it is now known is never visited by them; and it is also ascertained that they appear on their most southern boundaries, even before they are found in the north. Their most northern range is the south coasts of Greenland, while they extend in a southerly direction to the Scilly Islands. It is, however, a northern fish, and they visit our shores as the boundary of their migrations. The habits of this creature very clearly illustrate a very remarkable peculiarity in the marine zoology of our county. It is familiarly known to us all that large catches of herrings are annually made at St. Ives, and that they frequent the whole line of the shores of the Bristol Channel; on our southern shores, on the other hand, they are comparatively rare, and inferior both in size and condition. It is clearly ascertained that the herrings of St. Ives descend through the Irish Sea, and that when they return to their winter quarters, from the neighbourhood of the Scilly Islands, they always take a northerly course, and never wander to the north-east through the British Channel. Those taken on our southern shores have a westerly course at one time, and an easterly one at another. They are far more numerous towards the Straits of Dover, and decrease as you come west to Mount's-bay, where their presence in any large quantity is very unusual. It appears now as a well-ascertained fact, that the herrings of the north visit us through the St. George's Channel, while those of the south come through the Straits of Dover. An explanation can readily

be offered why these two migrations never mix, since it is observed with the pilchard, that two shoals differing in health never commingle. But why the herring of the north should never pass up the British Channel, when the slightest variations in its course would oblige it to do so, cannot be ascertained. There must be some peculiarity which we are unable to appreciate, except perhaps that of the effects of currents; for there cannot be much, if any, difference in the characters of the shores, the nature of the water, or the quality of food, in distances so short, subjected to the same temperatures and other vicissitudes incidental to so circumscribed a spot.

In examining the subject still further, other equally remarkable variations occur in the productions of our northern and southern shores. On the south, all our productions very closely approximate to the produce of the Mediterranean, and, from the rareness of some species, they must actually reach us from that distant spot. The *Muræna Helena*, a fish abundant in the Mediterranean, has been taken on our southern coast. It would occupy too much of your time to refer to each species on the present occasion; but all who have examined our zoology are struck with the coincidences of the two seas. The tunny and the bonito visit our western shores in shoals, and though they may, from their eager pursuit of prey, be carried to the north, yet their places of resort are in warmer climes. But even our minute *crustacea* and other trivial productions indicate the same approximation. On the north the case is different; for there, while there is an identity with the south in what may be considered as Cornish fish, and while they may occasionally receive a straggler from the south, yet their productions are modified by visitors from the north. The true sprat, which rarely visits the south, is frequently found in large shoals in all parts of our northern waters. At the Land's-end we are sometimes visited by the inhabitants of the Atlantic; and in the autumn, not unfrequently by the larger fish from tropical America. Our climate not being fitted for their permanent abode, their visits are only transitory; but any changes whereby our summer heat could be increased, would render that permanent, which is now only accidental.

Some of our *crustacea* are small which in the north are large, and some which we possess large, are found equally small to the north, and others are confined to circumscribed localities, and thus an interchange of species is effected, and an agreeable variety afforded to the pursuits of the naturalist.

Our land and fresh-water shells, though not numerous, are yet far more so than was anticipated, and the list has been extended by the labours of this society. Many shells which are common with us, are rare in other portions of the kingdom. The *Bulimus acutus*, so abundant on our Eastern Green, is almost confined to the south-western counties, South Wales, and the Isle of Man, but it has been discovered in the western islands of Scotland. *Helix Pisana* is abundantly found only at St. Ives, but it has been discovered near Tenby in Wales, and in Ireland, the most northern limit of its distribution: it is found, however, through the South of Europe and the coasts of Africa bordering on the Mediterranean Sea. Its isolated position at St. Ives is very remarkable; and this, together with other peculiarities both of our Fauna and Flora, has induced some of our speculative philosophers to suppose that a continuity of land at one time existed between us and the opposite shores of the Continent, as well as the southern borders of Ireland; but an equally clear, or I would rather say, an equally obscure, indication is given of our previous connection with a northern clime.

The zoology of this district is peculiar, isolated by extensive sheets of water from other localities, from which we could derive species, we possess an admixture of shells, both of a warmer and a colder clime, and yet the ascertained list is small. It appears that terrestrial shells abound in the warmest regions, and decrease, both in number and size, as you advance towards the poles, or rise in the mountain ranges. But the neighbourhood of London, and the central portions of England, have a more extensive list than Cornwall. This would be the case, if we suppose that we formerly had a connection with the south, and subsequently with the north; the cold of the latter would destroy the species that the former would have supported. This alternate extension of our land north and south has not yet been satisfactorily demonstrated, but the situations of some of our land shells are so very remarkable, that

they prove that our county has, in geologically recent times, been subjected to great and important climatic changes. At the present time, however, we must rest satisfied with the fact, that those countries composed of the older geological formations are less favourable to the support of these creatures than the newer and calcareous series. Mr. Gray observes, that the fossil shells now found in the different strata show that a different geographical distribution of these animals existed in a former state of our globe; for several genera were once found in our country which are now confined to warmer climates. But land shells are bad indices for the solution of the phenomena of the laws of geographical distribution, since they are so easily naturalized in new and distant localities by the skill of man.

But enough has been said to show the interest attached to the investigations contemplated by our society. The pursuit is open to us all: the objects are sufficiently beautiful to attract the mere collector, and their phenomena are so profound as to interest the philosopher. The pursuit bears closely on the developement and structure of our earth; and illustrates most clearly and beautifully the phenomena of life. Though the surface of our earth may change, and alterations may be effected in the arrangement of the living creation, yet the laws of Nature are immutable and universal, extending from the most minute to the most gigantic objects.

"The law which forms a lady's tear,
And draws it downward from its source,
That law it is, which moulds each sphere,
And guides each planet in its course."

Observations, &c., on the Death's-head Moth (Acherontia atropos).

By Mr. WILLIAM NOYE,

ASSOCIATE OF THE SOCIETY.

THE Death's-head moth, while it is the largest insect indigenous to Britain, is also one of the most interesting. It was formerly very scarce in this country, although noticed by Ray more than one hundred and fifty years ago; and White, in his Natural History of Selbourne, mentions its occurrence; but since the cultivation of the potatoe became general, its numbers have increased considerably. Over foreign lands it has a very extensive range of distribution; in all the southern countries of Europe it occurs in abundance; it is also found in Northern and Southern Africa, Madagascar, the Isle of France, in all parts of Southern Asia, and in the islands of the Indian Archipelago. There are three or four allied species, which very much resemble the one inhabiting our own country, but they are all smaller.

The periodical appearance of this insect in Britain induced many persons to conjecture that it was not truly indigenous; and its having been several times caught on board vessels at sea served to strengthen the opinion. But now, all doubt of its being a native of England is entirely laid aside; for the fact of its having been found in considerable numbers, both in the larva and pupa state, is sufficient to rank it amongst our British species. In the year 1826, it was so abundant in many parts of England, that from the potatoe fields in the neighbourhood of Ham, in Essex, a gentleman obtained a bushel of pupæ dug up by the labourers; and last year it was very common in most of the maritime parts of England.

The large size of the insect, its singularly marked thorax, which has a striking resemblance to a death's head with the cross bones beneath, combined with the peculiar squeaking sound it emits, has rendered it an object of terror to the superstitious, by whom it is regarded as the harbinger of pestilence and the forerunner of death. Latreille and Reaumer say that it appeared one year in Brittany in great numbers; and as at that time an epidemic disease was raging with much violence, the mortality was attributed by the ignorant to this harmless and beautiful moth; and even at the present day, and in our own neighbourhood, an idea prevails that the person who catches a Death's-head moth will not live long.

Much diversity of opinion exists amongst naturalists respecting the cause of the sound above alluded to. Reaumer attributes it to the friction of the proboscis or suctorial trunk against the palpi, and certainly the inner surface of the latter organs present a very peculiar structure, not altogether unfitted for producing it; M. de Johet, however, deprived a moth of its palpi and proboscis and still the sound was produced, especially when the wings were put in motion; from this he thinks, that the motion acting upon the air contained beneath the scales of the front of the thorax is the cause of the sound, more especially as a specimen having the scales cut off was mute. Another entomologist, M. Lorey, thought that he had discovered the cause of the sound in the air rustling through two tracheæ at the base of the abdomen, which in repose were concealed beneath two pencils of hairs, and which were dilated into a star when the noise was produced. M. Alex. Nordman, unacquainted with the researches of M. Lorey, adopted the same opinion, in a Memoir read before the Academy of Science at St. Petersburg, on the 1st of Dec., 1837. M. Passerini conceived that the sound was produced in the interior of the front of the head, being emitted from a cavity, which communicated with the canal of the proboscis, in which are placed the requisite muscles for the elevation and depression of that organ; the former movement causing the air to enter the cavity, and the latter, to be expelled from it:—in fact, the sound was produced, although the proboscis and abdomen were amputated; and it entirely ceased when the muscles were either cut through, or pierced with a strong pin thrust vertically into the head. M. Goureau

has suggested that the sound might be produced by the organs described by M. Lorey; but that, as the apparatus in question is not perforated, the sound must be produced in a similar manner to that of the *Cicadæ*.

By the experiments of the committee of French Lepidopterists, who published an interesting Memoir in the Annales de la Société Entomologique de France for 1839, detailing a number of observations made in conjunction, with a view to determine the question, by Messrs. Duponchel, sen. and jun., Aubé, Boisduval, Pierret, and Rambur, all the foregoing suggestions have been proved to be without foundation. Reaumur's view was disproved by unrolling the maxillæ, and holding the palpi apart with a pin, and yet the sound was produced; by holding the root of the maxillæ firmly compressed between a pair of forceps, so as to prevent the passage of air, the opinion of M. Passerini was shown to be unsound; by holding the wings close to the body, so as to prevent their action upon the frontal scales, the theory of M. de Johet was disproved, because at such time the insects squeak loudest, the scales being entirely motionless all the time. The opinions of Messrs. Lorey and Goureau are likewise disproved, by the action of the apparatus at the base of the abdomen not being always accompanied by the sound; in addition to these remarks it may be observed, that both sexes produce the sound, while the apparatus exists only in the male; and this is the case, not only in this species, but in many others of the *Sphingidæ*, which produce no sound similar to the one under consideration.

Subsequently M. Duponchel, jun., believed that the sound was produced by the friction of the prothorax against the mesothorax; and M. Goureau, that it was by the air rushing through the spiracles of the prothorax, which are large, and placed on a protuberance. The last mentioned author, who has written an elaborate essay on the sounds of insects, has still more recently suggested that the sound is analogous to that produced by the *Hymenoptera* and *Diptera*, which he calls "*piaulement*." This he supposes is caused by the vibrations of the thorax put in motion by its strong muscles, which give an impulse to the wings, when their action is complete; and that it is also probable that the action of the scales upon the mesothorax contributes to the sound, which

(unlike that of the *Orthoptera* and *Cicadæ*, but like that of some *Hymenoptera*) consists of a union of two sounds; one acute, produced by the vibration of the thoracic segments, and the other by the action of the scales in the mesothorax. However likely this opinion is to be correct, it is evident to any person acquainted with the sounds of insects, that the analogy is not complete when compared with the *Hymenoptera* and *Diptera*, for in them the sound, though not produced by the action of the wings, is much increased when they are in motion;—this is not the case with the insect in question.

The point still remains undecided; but as the insect is now of common occurrence in Britain, it does not reflect much credit on our entomologists that none of them have attempted to discover the cause of this mysterious sound.

During the last season I obtained several live specimens of the insect, and examined them very carefully, and yet failed to discover the cause of sound, or the organ which produced it. That it is not connected with the motion of the wings is evident from the foregoing observations. I have held the wings close to the body for several minutes at a time, and the sound has been produced as loud, or perhaps louder, than when the wings were in motion; and even when life has been almost, if not altogether extinct. By holding the insect in the same position, and placing my thumb against the front of the head and pressing it back, the sound was produced nearly, if not altogether, as loud as when the insect did it of its own will. I procured another specimen, which by rough handling had its head and prothorax broken off; had been some time dead before it came into my possession, and consequently was dry and stiff. It was placed in a vapour of prussic acid to relax it, that it might be re-set. Before the head was put on I breathed forcibly into the thorax, and by so doing produced a sound similar to that produced by the living insect. I relaxed it still more, but it did not then produce so sharp a sound.

Repeated dissections may elucidate this obscure question, and I hope therefore that the members of this society will preserve every specimen coming under their notice, to elucidate so obscure a phenomenon.

April 5th, 1847.

On the Migrations of the Pilchard (Clupea pilchardus).

By R. Q. COUCH, M.R.C.S.L., &c.,

ONE OF THE SECRETARIES.

OF that portion of the history of the pilchard which may be considered general, as well as the modes by which it is captured on the Cornish shores, so much has been said in Yarrell's "British Fishes," and in several Papers in the "Transactions of the Royal Cornwall Polytechnic Society," that they hardly need be more than alluded to again. Our chief attention will be directed to the habits and migrations of the fish as exhibited within our prescribed limits. This western portion of Cornwall must be considered as the chief seat of the pilchard fishery, and St. Ives as the head quarters. From the number of men engaged in the pursuit, and from the locality being very favourable for observation, the migrations can be more carefully watched than in any other part of the county. Deriving my information from the persons engaged in the fishery, and daily noting the exact spots in which the fish were taken, their course has been tolerably clearly ascertained. These notes, however, extend over the three years of 1844, 1845, and 1846. On a review of these records, I think there can be no doubt that the pilchard remains on some part of the Cornish shores throughout the year, and that it does not perform those extensive migrations formerly thought to have occurred. I have seen pilchards taken from the stomach of the hake, cod, and other predaceous fishes, during the winter and spring, and have seen them taken in the mackerel-nets in the spring and summer, on the

western fishing-grounds, including Mount's-Bay; and as the fishery is an autumnal one, their presence throughout the year is very clearly ascertained. In the spring mackerel-nets they are repeatedly taken; and early in summer small flocks or "*schulls*" are frequently seen sporting at the surface of the water. Towards the latter part of summer the regular fishery begins, and it is continued till late in the autumn on the southern shores; and at St. Ives, on the northern coast, large catches are annually made about October and November, and sometimes in December. They are most rarely seen during the latter part of winter, and very early in spring; then they are in deep water, on the south-western parts of Cornwall, at the entrance to the English Channel, and to the south and west of the Scilly Islands. At this time they swim deep, rising in proportion to the fineness of the weather, and their course is generally in a westerly direction, being most commonly taken on the eastern side of the nets. If the weather continues fine for some days, they are occasionally found irregularly to approach the shores in sandy situations, as at Mount's-Bay, Lamorna Cove, and Whitsand Bay, and also near St. Ives; but they rarely at this time congregate in large masses, and frequently a few stragglers only are to be seen. During the early part of summer, and late in the spring, such as about April, May, and June, they are occasionally found in small shoals, but without any definite course; sometimes going east, at others west; sometimes approaching the shores, and at others returning into deep water off the land. When the other fisheries have failed, advantage is taken of this their early appearance, and the boats go in pursuit of them. In 1842, on the 23rd and 28th of April, ten hogsheads were taken in Mount's-Bay; and in 1843, on the 30th of November, upwards of a thousand hogsheads were taken in Mount's-Bay by the drift-nets. In former years their early appearance was more frequent than it has lately been; thus about the year 1790, shoals of the pilchard were frequently seen in January and February. But even when they are not seen, if the nets are "shot" off the sandy inlets about sun-set, many will be frequently taken; but what seems strange, is, that they are all meshed on the shore side, and if taken in the morning, on the outside of the net. From this it appears that they approach the shore

during the day, and return to deeper water towards evening: such is the opinion of the fishermen, and such I believe, from their catches, to be the case. These diurnal migrations occur when the fish are supposed not to have arrived on our shores. As summer advances, the stragglers associate into small companies; these again unite into larger ones, called "*shirmers*" or "*braking-schulls;*" and finally into those large autumnal shoals which are the objects of the fishery. In the early spring they can hardly be said to be gregarious, for they move independently of each other, in a very irregular manner. When they begin to congregate, they rise to the surface, and though they move about without any apparent order, yet their general course is in a westerly direction; and this is ascertained by the side of the nets on which they are taken, and by the boats following the direction of their course. The great bulk of the fish, however, do not remain close to the shores throughout the year, but retire into deep water; and in their annual migrations they resort to the south-west, west, and north-west of the Scilly Islands and the entrances to the channels.

Late in July, or early in August, the boats of Mount's-Bay return from the coasts of Ireland, where they have been engaged on the herring fishery, and then they fall in with immense shoals of pilchards at the entrance to the St. George's Channel, and to to the south, and at the entrance to the English Channel. This I have had repeatedly confirmed by the masters of the vessels employed in the Welsh coal trade. Some of the fishing boats, which returned from Ireland in the second week of July, in 1846, found the shoals small, and much to the south of their usual position, but they were going in a northerly direction; those boats, however, which returned at their usual time, the first week in August, found them on the same spot, and in schulls of the same size as in former years, but with a southerly course. As this evidence is confirmed year after year, it may safely be supposed, that early in spring and summer they retire into deep water, and gradually congregate at the entrance to the English and St. George's Channels, till the period of their migrations towards the land. While this may be remarked on the great bulk of the summer fish, yet there is good reason to believe that all do not retire

so far to the west, for good catches are sometimes made in June and July, to the south-west of Mount's-Bay, to the south of the Lizard, and off the Deadman point. But as we advance eastward they become more and more scarce. About Mevagissey, Fowey, Polperro, and Looe, catches are made in June and July, but it is not till August and September that the great catches are expected, and then the boats go west to meet the shoals as they advance eastward.

The chief resort of the pilchard, therefore, so far as I have yet ascertained, during the period of its congregating, is to the west of the Scilly Islands, extending to the north, and occasionally the circumference of the shoals extends to near the Welsh and Irish shores, and eastward, along the western shores of Cornwall, in deep water. But the united testimony of all our men engaged in the Irish herring fishery is, that they never saw, in any season, more than one or two pilchards to the north either of the Small's lighthouse on the Welsh shores, or of a line extending from that spot to Waterford, in Ireland. As they are engaged in the capture of the herring, and as that is carried on in precisely the same manner as the drift-net fishery for the pilchard, their rarely taking more than one or two pilchards in a season to the north of that line is worthy of especial notice. A better test of their presence could not be devised, as the same nets are used in many instances on both occasions. Further observations, however, are required before this can be assigned as their northern limit; they may wander further after the boats have left the shores, for at that time their course is frequently in that direction. One thing however, is certain, that they cannot go much beyond this line, as the period of their appearance on the Cornish shores takes place within a fortnight from that time. To the south of this line, their chief resort is on the Cornish side of the Channel,—from off St. Ives to the Land's-end. The "*schull*" or "*schulls*," when they begin their great annual movement, pass southward, and a portion strikes the land to the north of Cape Cornwall, and turns in a north-easterly direction towards St. Ives, and constitutes its summer fishery, which in that district is the smallest. The great bulk passes between the Scilly Islands and the main land,

through that sheet of water called the Lionese, like an immense army, extending itself parallel to the land. To look from Cape Cornwall, or from any of the high lands of St. Just, and see this immense moving mass extending as far as the eye can reach, approaching the shores and reddening the waters, is a sight of great interest and beauty, and such an one as would repay any exertion to witness;—they approach, and

> "Forthwith the sounds and seas, each creek and bay
> With fry innumerable swarm, and shoals
> Of fish, that with their fins and shining scales
> Glide under the green wave in schulls that oft
> Bank the mid sea."

In most of the sandy bays in their passage, seines are established for their capture. In some seasons they approach so near, that their course corresponds with the indentations of the shores. They will take, for instance, the sweep of Whitsand Bay, and pass between Cowloe and Pedn-mean-du, and between the Longships lighthouse and the Land's-end; then close to Tol-pedn-penwith and Pedn-mean-annear, and from thence into Mount's-Bay. Sometimes they pass into the bay, and at others cross over towards the Lizard. During this part of the fishery the boats of Mount's-Bay go to the westward, and get a clear offing to the north-west, so that the fish may come uninterruptedly to their nets, the meshing always occurring from that direction. After this their progress is eastward; but it depends on the state of the tide whether they shall cross to the Lizard, or take the sweep of Mount's-Bay. If they strike the Lizard, they turn in by the land, and are taken at Mullion. If they pass beyond the Lizard, they go on to Mevagissey, Fowey, Polperro, Looe, and the other eastern points of the fishery. During the last season, after the fish had passed Tol-pedn-penwith, they disappeared; but on the fourth day after it blew smartly from the south-west, when the fish struck the shore near Marazion Green and St. Michael's Mount, and there they were taken by the seines. At another time they disappeared at the same point, and in three days were observed at Mullion,

on the eastern side of the bay. If they are taken by the drift-nets, off in the bay, their course is eastward; if near the shore, it is westward; this can only be accounted for by the currents, which are then setting in the same direction. So that if the fish approach the shore to the west of the Lizard, they afterwards sweep in and return to the west. Of late they have not gone so far eastward as in former years. Though the great "*schull*" is as large as formerly, or very nearly so, yet the fish that pass up our southern shores have greatly decreased, if the quantities taken be an index to the quantity existing. This, however, I think is not the case, for the quantity taken depends more on the direction the fish may take, and the distances the shoals may keep from the shore; if they pass up in deep water, they escape the seines, and in some measure the drift-nets; and if they swim low in the water, they escape altogether, and the fishery is a failure. The season of 1845 cannot by any means be considered a good one, and yet the quantity of fish that passed round the Land's-end was as great as in any former year. In 1846, they passed much nearer the shores than has been usual of late, and in the eastern fishing-grounds the quantity taken was unusually great. When the fish prefer deep water, the fishery is very uncertain and the catches partial; for they will move in the usual mass for days together, with very little variation; and then, as if actuated by one impulse, will suddenly approach close to the shores, swarming in some spots, while others are entirely free, so that the different stations may be more or less successful from this cause alone. The cause for these sudden movements is not yet ascertained. The function of spawning no doubt exercises great influence, and the state of the weather produces some effect; the currents of particular localities may and do determine local directions, but the grand movements of the mass must be determined by other and more universal causes. Sometimes the fish are in pursuit of food, and when the fishermen find their nets covered with "sea lice" (*Entomostraca*), they always expect large catches. But the shoals appear sometimes to be merely sportive, and at others pass along the shores with great rapidity, as if in search of a given object. The cause of their migrations is at present unknown; and the probable cause that

can limit their wanderings from the "Smalls" on the north, to the Cornish shores, to the Start Point and Bigbury Bay, in Devonshire, on the east, cannot even be surmised. The same food, the same water, the same temperature and shores, equally varied with those marking the line of their migrations, are to be found widely extended beyond those limits. Diligent and long-continued observations may eventually elucidate this obscure point in their history, but at present we must remain contented with the facts.

The "*schull*" to which I have been referring is the one commonly called the "summer *schull;*" there is another which the fishermen call the "winter fish." This last, from the spot in which it first appears, from its course, and from the appearance of the fish, is perfectly distinct from the former. The winter shoals always first appear on the north-eastern portions of our shores. They are very rarely seen to the east or north-east of Lundy Island. After having touched the shore, they always pass down close by the coast, and that in such vast swarms as even to obstruct the passage of vessels through the water. That this is no exaggeration may be rendered evident from the statement of one amongst many ascertained facts. At the usual time, in 1834, this immense shoal passed into St. Ives Bay; and a portion remained in the waters on its western side, and occupied the whole of the distance from the mouth of Hayle River to the town of St. Ives, a distance of more than two miles in a direct line, and the transverse diameter of the shoal was about three-fourths of a mile. To this mass of fish a seine was *shot*, or, to render it clearer to persons not acquainted with the fishery, a seine was made to enclose as much as its length would allow, and my friend, Joseph Carne, Esq., has furnished me with the result. He says in a letter,—"The largest shoal of pilchards ever enclosed, was taken in a seine of Mr. Roger Wearne, at St. Ives, on the 25th of November, 1834. The fishermen were engaged in *tucking*, or taking the fish out of the seine, from the 26th of November (Sundays excepted) to the 5th of December. In that period one hundred and twenty boat-loads were landed, one boat-load was sunk, and several loads were lost in *tucking*. The whole

quantity taken up and carried to the cellars was 3,600 hogsheads, which with the lost fish would have been at least 4,000 hogsheads, each containing 50 wine gallons, or about 3,000 pilchards (as the fish were not large), making altogether, the enormous quantity of 12,000,000 fish." To render the density of the fish still more intelligible, I would observe that a seine is about 160 fathoms in length, and from 8 to 12 fathoms in depth, so that the 12,000,000 pilchards were enclosed in a circle not 54 fathoms in diameter; and in this case but 7 fathoms deep. On the same occasion other seines were *shot*, but in consequence of a legal dispute, some of the fish were not taken out of the nets for several days, and therefore, for security, the seines were drawn a few fathoms towards the shore into shallower water and anchored. It was however subsequently thought best to land the fish first, and decide the dispute after. But on *tucking*, all the fish were discovered to be dead; the slight alteration in the depth of the water on such a dense mass had suffocated the whole. These are striking, but not singular instances of the density of the masses into which the pilchards frequently congregate. As they pass in such immense shoals parallel to the shores, discolouring the waters and filling our bays, large quantities are frequently pushed on shore by the moving hosts behind. Their course can be daily watched from the hills, after they have once approached the land. In October of 1846, a shoal passed into St. Ives, and while on the western shores of the bay, 30,000 hogsheads were enclosed in a few hours: now if we suppose 2,500 only to the hogshead, we here have 75,000,000 fish enclosed in a single port in one day, while large quantities remained at liberty beyond. Of this catch about 23,000 hogsheads, or about 51,500,000, were landed. The winter shoals are remarkably punctual in their appearance: they generally arrive at St. Ives about the third week in October, varying to the first week in November. In 1844, they passed the whole length of the northern shores of Cornwall to St. Ives in about four days; and from this circumstance they were expected round Cape Cornwall and the Land's-end daily; but they took three days to make the circuit of St. Ives Bay; but on passing Clodgy Point, its western boundary, they resumed their former rapid progress, and in two

days made their appearance in Mount's-Bay and passed up the British Channel. In their passage round the Land's-end, they passed close to the rocks.

The winter fish are larger, but by no means so oily as those of the summer. A hogshead of summer fish will produce on an average about four gallons of good oil; sometimes, however, as much as nine gallons have been expressed, and at others only two and a half, or three. The winter fish will yield on an average only two, or when very good, three gallons of oil. But it should be observed, that the quantity expressed in winter slightly varies with the character of the weather; if the cellars be well ventilated, it is less than when the windows and doors are closed: so that if the summer fish could be cured in very cold weather, the average might be something less than four gallons, and the winter fish might produce more than the quantity specified if the weather was warm. But there is a decided difference in every particular between the two sets of fish.

The foregoing observations refer chiefly to the annual migrations of this fish, but there are more minute habits, which disappear in the great annual assemblies, and these exert some influence on the fishery. During the periods when they are not sought after by the fishermen, they wander either singly or in small companies, in deep water, and rarely mount to the surface. As summer advances, they congregate in small shoals, but they show a greater tendency to do so during the day, especially towards the afternoon, than in the night. As night approaches, they show an inclination to move off the shore, and re-unite, after daylight, in the morning. But when the migratory influence is fully established, these habits become obscured, and finally obliterated, or rather overwhelmed, in the general tendency of the whole to approach the shore. The seine fishery is carried on from sunrise to sunset, and the drift-net from sunset to sunrise.

While the general course or direction of the fish appears to have been always similar to that of the present day, yet the seasons vary very much as to the quantity taken;—and taking remote dates as a guide, in the periods of their appearance on our shores. Lately, however, they have rarely varied more than a few

weeks. If we look at the old records, we find the fishery entirely different from what at present obtains: thus, in 1747, Falmouth exported 14,632, Penzance about 12,149, and St. Ives only 1,282, hogsheads. This, however, may not have arisen from a change of any one of the shoals, but from an alteration in the preponderance of the summer or winter fish. But there are certainly variations in the precise points of the shores at which they first arrive: spots that in former years formed their favourite hauuts are now never visited by them. The fishery on the Devonshire coasts, such as at Dartmouth, Bigbury Bay, &c., are I believe all but given up, while but a few years since they were very prosperous. St. Ives, from having only one seine, belonging to Messrs. Bolitho, has now one hundred and eighty, a number greater than all the other stations can exhibit.

At the present time, the general place of resort for the pilchard is to the west of the Scilly Islands and the circumjacent water, some of the smaller shoals even frequenting the southern shores of Ireland; but Thomas S. Bolitho, Esq., informs me that in September, 1836, the great mass of the fish appeared on the north-east part of the Bay of Biscay, a position much to the south of that usually occupied at that time. In that season the fishery was very late; so late, indeed, that it was almost given up as an entire failure. A captain of one of his vessels returning from the Mediterranean arrived in the Thames, and told him of an immense shoal he had passed three days before, and which he left forty miles to the south-west of the Lizard, in the Bay of Biscay, the course of which was in a north-easterly direction. His tale was, that from the time he fell in with them he had a light breeze, and was going before it about five miles an hour, and that the time occupied in going through the mass was more than twenty hours, making at least a shoal of a hundred miles in length; the breadth he could not ascertain:—he discovered what they were by taking some up in the ship's bucket. Two days after, this account was confirmed, by the shoal approaching the shore; it extended from Fowey to the Land's-end, a distance fully equal to what he had described, if the windings of the shores enter into the consideration. While, however, they do

not wander much beyond the Cornish shores, yet some have been taken in the Downs, and off Dover and the Isle of Wight, by the herring drift-nets; and a few have been taken on the coast of Spain. In 1791, the drift-nets took large quantities in February, and in 1834, they were abundant at Mevagissey about the same time. It may therefore now be asserted, that the pilchard remains off the Cornish shores throughout the year. The largest quantity ever secured in one day occurred at St. Ives in September last,—the 30,000 hogsheads referred to before.

It may be interesting, perhaps, to some of your ichthyological readers, to refer, however briefly, to a few of the more casual traits of this small, but important fish. On the southern shores of Cornwall the herring is rarely to be met with, except in a few straggling companies; on the northern shores, however, it is more abundantly caught. It is a habit of all the species of the genus *Clupea* to associate in companies and shoals; but the herring and pilchard never intermingle: small companies of each will pass and repass each other without mixing. Early in the season some boats will capture herrings, while others, but a short distance from them, will take nothing but pilchards; others again will take both, as might be expected from the nature of the drift-net fishery. The seines also will sometimes enclose one and sometimes the other, but never both, in such quantities as to lead us to suppose an indiscriminate mixture of the two. When they are first preparing for their migrations, fish of the same size and fatness always herd together; so that different seines will take very variable fish: but when the whole are united and the migratory feeling is at its greatest development, then the largest and healthiest fish take the lead, and the weaker and smaller portions fall into the rear and form one shoal; hence the fish first taken are generally the best. It is also a remarkable circumstance, that when the pilchard has assembled, it displaces all the other fish having a similar habit. It drives nearly all other kinds away, except those which make the pilchard their prey, such as the hake; but in the largest "*schulls*" even these disappear. These facts will explain several observations of the fishermen, by which they regulate their hopes and fears. At St. Ives, it is a general remark, that the herrings always are

inside the shoal of pilchards, and that when these are taken near the shore, the bulk of the pilchards may be expected, the explanation being that the herrings are driven before the advancing hosts. If mixed fish are taken in the drift-nets, no shoals are expected, in consequence of the assembling not being completed.

My notes for the season of 1846, after the foregoing lengthy remarks, shall be very short. The fish were seen daily from the time of their first appearance. The fishery began, in this district, in August, and on the 5th, moderate quantities were taken off St. Ives; about 5,000 per boat per night. On the 9th, 10th, and 11th, small catches were taken in the south-west part of Mount's-Bay, and one seine *shot* and enclosed about two boat-loads: at this time, to the east, 1,200 hogsheads were taken in Gerrans Bay; and the drift-nets were very successful at Falmouth, Charlestown, Mevagissey, Fowey, Polperro, and Looe. From the 12th to the 19th, the catches in Mount's-Bay continued small; about the Lizard, 1,000 hogsheads were taken: at this time no pilchards were taken at St. Ives. From this it appears, that the shoals crossed Mount's-Bay eastward, to the Lizard and the eastern stations, in deep water. While they were thus abundant in the east, they were all but absent in the west. From the 19th to the 26th, very few pilchards were taken at Mount's-Bay, and none at St. Ives: at Falmouth the catches were good; but at Looe, Polperro, and Cawsand, in Plymouth Sound, the quantities taken were greater than before, showing an eastern movement. From the 1st to the 8th of September, the fish came nearer the shore, and were taken in large numbers at Polperro and Looe, equalling 30,000 per boat every night. At this time, while the summer fish were on the south-western shores of the county, the winter fish were observed on the north-eastern shores, at New Quay, about three or four miles from land. On the 13th, the northern fish were seen from the hills near St. Agnes, and on the 15th and 16th, off St. Ives, but the shoals were small and distant: large catches were still made on the south-eastern shores. From the 16th to the 19th, south-eastern fishery still successful; the north-eastern shoals off St. Ives in deep water. For a week after this all the fisheries failed, but the shoals were observed to be congregating on the

north-eastern shores; and on the 27th, *heva* was sounded at St. Ives: the bay was full of fish from one side to the other, and 30,000 hogsheads were quickly enclosed. From St. Ives they go further west, sometimes beyond the Scilly Islands, and at others between the islands and the Land's-end. In some seasons, after thus passing south, they take an easterly turn along the south coasts to Mevagissey Bay, where they generally arrive about the middle of November. But in every case in which they have gone so far to the east, they have been followed by large *Cetacea*, generally *Delphinus delphis*, several of which have from time to time been taken. In the present year the winter fish arrived at St. Ives several weeks earlier than usual. Mr. Bolitho made a very interesting observation to me, a short time since, in reference to the movements of the pilchard and the herring, which, if it always proves correct, will be worthy of further investigation: he stated, that the herring fishermen of Yarmouth were always desirous of carefully ascertaining the time when the pilchard arrived at St. Ives, or could be seen from the hills, for that the arrival of the pilchard at St. Ives coincided to a day with the arrival of the herrings at Yarmouth; whether the season was early or late, they were early and late together; and if the pilchard at St. Ives arrived without the herring at Yarmouth, the fishery in the latter place proved a failure for the season.

The pilchards frequently arrive close to the shore before they are discovered; in such a case the drift-nets serve as an index to the fishermen. The experienced eye of the *huer*, or watcher for the fish, can, however, frequently detect their presence when all others would fail. On one occasion, a *huer* at St. Ives raised the cry of *heva*, when no one else could see the least indication of their presence. The seine, however, was *shot* according to his direction, in a muddy part of the bay, but still no fish appeared till many hours after, when they all simultaneously rose to the surface, and 1,200 hogsheads were afterwards taken up.

The pilchard is very sensitive to atmospheric changes; if there should be cold bleak winds from the east, north, or north-east, they rarely rise or approach the shores; if it should be a calm, or a good breeze from the south, south-west, or west, they very rapidly

associate; and a day or two previous to a storm they will frequently move with great rapidity. The shoals are supposed by the fishermen to be guided by a very large fish, which they call a king, but whether this be the case or not, each shoal is undoubtedly led by the larger and stronger individuals. They always move with great precision, and all their evolutions are simultaneously effected. A shoal, when enclosed, will sometimes remain in regular order and motionless, with their heads all turned in one direction, for a very long time; but if the boat be struck loudly, the whole will instantaneously turn to the opposite point, without the least confusion, like soldiers at a review.

The number of drift-net boats engaged in the pilchard fishery in Mount's-Bay is 180, each having seven men, and the quantities taken by them are very great. Each hogshead contains from 2,000 to 2,500 fish. The quantity exported for the last ten years amounts to 176,168 hogsheads; one-third more is used for home consumption, and large quantities, from being suffocated in the seines, are yearly used for manure.

During the last season 34,350 hogsheads have been exported; 3,052 of which were sent to Genoa, 8,274 to Leghorn, 1,368 to Civita Vecchia, 13,925 to Naples, and 7,731 to the Adriatic: of these, 20,618 were exported from St. Ives, 8,273 from Penzance, 3,213 from Mevagissey, and from Falmouth, Looe, and Charlestown, 2,246.

As it is not the object of these notes, already extended beyond their intended limits, to refer to the fisheries any further than to illustrate the habits of the fish, the account of them is designedly omitted.

For the following notes and table, I am indebted to Thomas S. Bolitho, Esq:—

"The quantity of pilchards taken during the past season has been larger than usual. In the months of August and September, nearly 11,000 hogsheads were cured, of which about 5,000 hogsheads were caught eastward of the Lizard, 4,000 hogsheads in

Mount's-Bay, and 1,600 hogsheads at Saint Ives. The quality of the summer fish when caught was good, but being cured during hot weather, many of the parcels on arrival at market proved in bad condition.

"On the 27th of October, large shoals were enclosed at St. Ives, of which nearly 19,000 hogsheads were cured for export; besides a considerable quantity sold for home consumption; and immediately afterwards, about 4,000 hogsheads were landed in Mount's-Bay, and 400 hogsheads eastward of the Lizard. The quality was very fine.

"The price of the summer fish varied from 35*s*. to 38*s*. ℔ hogshead, whilst the price of the winter fish ruled from 32*s*. 6*d*. to 36*s*. ℔ hogshead."

PILCHARDS EXPORTED, 1846.

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
Charlotte	200	St. Ives	16 September		200			
Snow Drop	600	Mevagissey	29 „				600	
Rose	523	Ditto	30 „			523		
Sophia	563	Penzance	3 October		563			
British Queen	550	Ditto	13 „	550				
Eliza	600	Mevagissey	13 „		600			
Chandos	624	Falmouth	13 „					624
Ann	360	Penzance	13 „		360			
Roseland	550	Mevagissey	15 „					550
Azores Packet	400	Penzance	17 „				400	
Flirt	377	Ditto	23 „	377				
Patriot	567	Ditto	26 „				567	
Albion	940	Mevagissey	27 „				940	
Elizabeth	460	Penzance	29 „	460				
Francis Yates	673	St. Ives	31 „		673			
Earl of Devon	697	Ditto	5 November				697	
Sancho Panza	603	Penzance	7 „				603	
Concord	522	Looe	7 „		522			
Jane May	483	Falmouth & Penzance.	8 „					483
St. Aubyn	462	Charlestown	27 „				462	
Caught in August and September	10,754	Carried forward		1,387	2,918	523	4,269	1,657

PILCHARDS EXPORTED, 1846—*continued.*

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
Brought forward.	10754	.....	.....	1387	2918	523	4269	1657
Camilla	608	St. Ives	27 November	.....	.....	.....	.....	608
Ospray	630	Ditto	8 December ..	.....	630	..	..	..
Hayle ..	700	Ditto ..	8 „	.....	.....	.....	700	..
David Banks	600	Ditto	8 „	600	..	..	..	..
Little Briton	450	Penzance	8 „	.....	.....	.....	.....	450
Lady Rowley	475	Ditto	9 „ ..	.....	.....	475	..	..
Reform ..	546	Ditto ..	9 „	.....	.....	.....	546	..
Undaunted	600	St. Ives	9 „	.....	.....	.....	600	..
Julia	600	Ditto	9 „	.....	600	..	..	..
Silura	391	Penzance	12 „ ..	.....	.....	.....	391	..
Lady Brougham ..	475	St. Ives ..	14 „	475	..	..	..	..
Prince Albert	500	Ditto	14 „	.....	.....	.....	500	..
Storm	600	Ditto	14 „	.....	.....	.....	.....	600
British Queen	550	Ditto	16 „ ..	.....	550	..	..	.....
Acastus ..	670	Ditto .	16 „	.....	.....	.....	.....	670
Tyne	885	Penzance	17 „	.....	.....	.....	885	..
Brilliant	500	Ditto	17 „	.....	500	..	..	..
Dromo	564	Ditto	18 „ ..	.....	.....	.....	564	..
Spirit ..	700	St. Ives ..	18 „	.....	.....	.....	.....	700
Rhoda	600	Ditto	18 „	.....	.....	.....	600	..
Mary	600	Ditto	18 „	.....	.....	.....	.....	600
Carried forward..	22,998	.....	.....	2,462	5,198	998	9,055	5,285

PILCHARDS EXPORTED, 1846—*continued.*

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Cevita Vecchia.	Naples.	Adriatic.
Brought forward.	22998	.....	.....	2462	5198	998	9055	5285
Jane Cumming ..	584	St. Ives	24 December	.....	.....	.....	584	..
Bezaleel	630	Ditto	24 „ ..	.....	630	..	..	.
Iris	500	Ditto ..	24 „	.....	500	..	..	..
Victory	500	Ditto	24 „	.....	.....	.....	.....	500
Porcia ..	800	Ditto	24 „	.....	.....	.....	.....	800
Rovena	590	Ditto ...	24 „ ..	590	..	..	..	..
Nelson	600	Ditto ..	24 „	.....	600	..	..	..
Hematope	395	Falmouth	24 „	.....	395	..	..	..
Gazelle ..	540	St. Ives	25 „	.....	.....	.....	.....	540
Mary's	600	Ditto	25 „ ..	.....	.....	.....	600	..
Britannia	450	Ditto ..	25 „	.....	.....	.....	450	..
Salcomb Castle	614	Ditto	25 „	.....	.....	.....	614	.
Why not ..	656	Ditto	27 „	.....	.....	.....	656	..
Arrow	370	Ditto	31 „ ..	.....	.....	370	..	..
Marquis of Lorn ..	560	Ditto ..	31 „	.....	560	..	..	..
Melanira	606	Ditto	31 „	.....	.....	.....	.....	606
Jasper	550	Ditto	31 „	.....	.....	.....	550	..
Mary Stewart	458	Ditto	1 January, 1847 ..	.....	.....	.....	458	..
Prometheus ..	342	Penzance ..	11 „ „ ..	.....	.....	.....	342	..
Invincible	616	St. Ives	11 „ „ ..	.....	.....	.....	616	..
Pomona	391	Ditto	30 „ „ ..	.....	391	..	..	..
Total ...	34,350	.....	.....	3,052	8,274	1,368	13,925	7,731

Distribution of Pilchards exported from 1833 to 1846, inclusive.

	Genoa.	Leghorn.	Civita Vecchia.	Naples.	Ancona. Venice. Trieste.	Malta.	Total.	Prices paid per Hogshead.	
								Summer Fish.	Winter Fish.
1833	617	1425	368	3882	3632	.....	9,924	50*s.*	50*s.*
1834	2558	4199	1457	7441	9136	293	25,084	55*s.* 6*d.*	36*s.*
1835	1076	5281	2122	8819	5964	552	23,814	40*s.*	35*s.*
1836	827	5060	.....	3647	9184	.....	18,718	40*s.*	36*s.*
1837	.....	4171	.....	6434	4759	.....	15,364	58*s.*	40*s.*
1838	505	744	.....	4080	2298	.....	7,627	55*s.*	60*s.*
1839	640	1546	550	5618	4470	.....	12,824	55*s.*	60*s.*
1840	600	2820	1028	7967	10895	.....	23,310	70*s.*	60*s.*
1841	420	2795	.....	3629	2761	.....	9,605	50*s.*	55*s.*
1842	1048	4007	921	6081	8146	511	20,714	50*s.*	40*s.*
1843	413½	2520	865	745	4276½	.....	8,820	50*s.*	54*s.* to 60*s.*
1844	862	3216	998½	3446	5437	.....	13,959½	45*s.*	52*s.* 6*d.* to 54*s.* 6*d.*
1845	2197	5213	800	12622	9154	.....	29,986	45*s.* to 47*s.*	54*s.* 6*d.* to 40*s.*
1846	3052	8274	1368	13925	7731	.....	34,350	35*s.* to 38*s.*	32*s.* 6*d.* to 36*s.*

The recent capture, in Cornwall, of Hemiramphus Europœus.

[Plate II., fig. 1, 2.]

By JONATHAN COUCH, Esq., F.L.S., &c.,

MEMBER OF THE SOCIETY.

MY first acquaintance with this fish was in the month of July, 1818, when, as I was engaged in taking prawns, in the harbour at Polperro, my attention was drawn to a very little specimen, which was actively exerting its powers close to the surface, and having secured it, I made as minute an examination as its size admitted, but this was necessarily imperfect, as it did not exceed an inch in length. The result was communicated to the Linnean Society, and it was inserted in the 14th volume of their Transactions. In examining this specimen it became too much injured to be able to obtain from it a satisfactory figure; and as no species of what is now denominated the genus *Hemiramphus*, to which it obviously belonged, had been discovered in the seas of Europe, the small size of this specimen was supposed by most naturalists to warrant the belief that the description ought not to be depended on; and consequently it was only mentioned incidentally in the first edition of Mr. Yarrell's British Fishes. This state of uncertainty continued until the year 1837, when Mr. Clerk of Ipswich obtained on the coast of Suffolk a considerable number of the same species of fish, from which Mr. Yarrell derived the figure and account which he inserted in the supplement to his History of British Fishes, and afterwards in the second edition of the same work. The opinion of that gentleman appears to be strongly in favour of the fact, that these

specimens belong to a fish new to the British seas, if not altogether new to science. Unfortunately, however, the specimens which came into Mr. Yarrell's possession were also of small size, and from them no satisfactory description could be taken. In consequence of this, doubts still remain in the minds of some, whether this fish be referrible to any of the known species of the genus referred to, or whether it be not the very young condition of the common gar-fish (the *Esox bellonè* of Linneus, and *Bellonè vulgaris* of Cuvier), which, it is contended, may pass through changes as great as this configuration of the jaws implies, in its progres to maturity.

One strong argument for the truth of the opinion, that the *Hemiramphus Europæus* is a distinct species, is found in the fact, that minute specimens of the gar-fish have been obtained, with the jaws in the same form and proportions as in the adult fish. But even this has not been thought decisive, and further proof is demanded, which can only be derived from the examination of the *Hemiramphus* of larger growth. It is obvious that an opportunity for settling this question in the manner thus required must be of rare occurrence; and it is therefore with much pleasure that I have it in my power to communicate a more precise description than any which has hitherto been published, and thus leave no further reasonable cause for doubt.

On the eleventh day of September, in the present year (1847), while the pilchard drift-boats were about four or five leagues from land, the top of a wave broke on board of one of them, and brought with it this little fish, which the master immediately secured for my use. He brought it to me, carefully wrapped up in cloth, as soon as he came on shore.

The length was 3½ inches; of which, from the angle of the mouth to the end of the lower jaw, was 1 inch and about an eighth; a proportion longer than that of my first specimen, or Mr. Yarrell's figure. The eye is large and silvery; head flat; angle of the mouth depressed, but the gape straight anteriorly; nostril large, in a cavity close in front of the eye; upper jaw pointed, armed with teeth along its length, the lower jaw furnished with teeth only so far forwards as corresponds with those of the

upper jaw;—beyond this it is plain, and without a furrow; the teeth are perpendicular to the jaws, straight, not very closely set, long for the size of the fish, but not of regular height. The general figure of the body is well represented by Mr. Yarrell, and resembles that of the gar-fish. Lateral line straight; colour of the back bluish, which is separated by a defined line from the side;—the side, and belly, of a bright silvery hue. Pectoral fins high on the side, somewhat elongated and slender, and when I received the fish both were thrown forward,—apparently from the struggle of its capture; the dorsal and anal fins far behind and opposite, reaching to the origin of the tail; they are narrow posteriorly, and the latter, at least, falcate; the dorsal with a tint of green; tail concave; C. 16 rays; P. 9. A portion of the flesh was stripped down at the base of the dorsal fin, which afforded me the opportunity of perceiving that the spinal processes of the vertebræ, and consequently, as I suppose, all the bones, are green, as in the gar-fish. When placed for a short time in diluted spirit of wine, rows of dusky spots appeared along the course of the ribs, leaving a longitudinal stripe of silvery white still remaining above the lateral line; but these spots disappeared when the fish was transferred to Goadby's preserving fluid.

As, from the abundance of the young of this fish that were seen by Mr. Clerk, it would appear at times to be not uncommon, the rarity of its capture is probably the principal reason why some naturalists continue to express doubts of its being other than a mutilated or irregular specimen of the gar-fish. But that it is not more frequently taken will not be a subject of surprise, if, as I feel strongly disposed to conclude, it does not usually attain a size beyond that above described. All the known species of this family (*Esox belonè* and *Scomber esox*) are accustomed to keep in the open ocean, where they swim high. The skopster (*Scomberesox saurus*) has become a rare fish since the drift-nets have been sunk a fathom or two beneath the surface. If, as there is much reason to believe, both from its generic affinities and the manner in which this specimen came on board the boat, as well as from what I myself saw, this fish swims close to the surface, at a distance from the land, we need not be surprised if

it does not become entangled in nets, the meshes of which are far too large to retain it.

The accompanying figure is of the natural size of the fish; and the most cursory inspection displays a length of the under jaw altogether unlike that which is ever found at any stage of the existence of the gar-fish. But, to render the difference between these fishes more unquestionable, a magnified figure of the head of the one, drawn with the aid of a microscope, and a diminished drawing of the other, are brought together. The following measurements have also been taken. In the *Hemiramphus*, from the posterior edge of the gill-cover to the point of the upper jaw, 6½ lines; and beyond the point of the upper jaw the lower projects 11⅔ lines. From the point of the under jaw to the posterior margin of the gill-covers it is 18 lines; and from the latter to the end of the tail, 23½: whereas in a gar-fish, measured by way of comparison, these respective measurements afforded 4 inches, 8 lines, and 15 inches; a disproportion greater perhaps than in any other species of fish of kindred genera; and of itself a strong argument for their being of a different race. The variation also extends to other particulars: thus, in the *Hemiramphus* the nostril is proportionally larger, and the mystache, as it passes upward in front of the nostril, more slender. In both fishes the form of the teeth and their mode of insertion in the jaws are similar; but in the gar-fish those in the upper jaw are the largest, whereas in the *Hemiramphus* the reverse of this is the case. Of the fins, in the gar-fish the pectoral is short; but in this it is narrow and more lengthened, and the dorsal and anal proceed much more closely to the tail. In the gar-fish there is a second lateral line along the edge of the abdomen from the thorax to the vent; but of this I could not perceive a trace in the *Hemiramphus*.

The figures which I possess of other specimens of this genus are not sufficiently precise to enable me to institute a satisfactory comparison between this and the recognized species of *Hemiramphus*; but it appears to possess specific differences from all of them, sufficient to warrant its claim to be retained as a separate species.

On the occurrence of some rare Birds in the district of Penzance, between Sept., 1846, and Sept., 1847.

By EDWARD HEARLE RODD, Esq.,

one of the secretaries.

IN the Report which has just been read to the society, reference is made to several rare species of British birds having been observed in this locality since our last annual meeting: three of these birds are very valuable additions to our Fauna; viz.,—Schinz's tringa, the ivory gull, and the scops-eared owl.

The first of the above species (Schinz's tringa) is so rare that it scarcely finds a place in the works of our British authors on natural history. Neither Selby, Jenyns, Bewick, nor Montagu make any mention of it in their valuable works, and Mr. Yarrell, in his recent History of British Birds, speaks of a single specimen only having been killed in Shropshire, on the authority of Mr. Eyton; and he quotes American ornithologists for an account of its habits and distribution. The bird itself is not at all remarkable for elegance of plumage, and at first sight would appear to be a mere variety of the common dunlin, which may be seen at all times of the year in large flocks on our sea-shores and estuaries. The shorter beak and the white upper tail coverts are the principal characteristic differences in this species.

The next bird of peculiar interest which has been captured in the past year in this neighbourhood is the ivory gull (*Larus eburneus*). This bird is found no where in greater numbers than in the extreme arctic regions, and its visits to the British Isles have been very rare, even on the Scotch coast. The following notice appeared in the

"Zoologist," as to the appearance of one of these birds in Scotland about the same period as the example now under notice appeared at Penzance, viz., in February last:—"The continued prevalence of snowy and tempestuous weather for some time past has compelled the arctic birds to leave their customary haunts; and in consequence some of those species which are rarely to be seen in this country have lately made their appearance on the shores along the Moray Firth—of these one of the most unusual and interesting is the ivory gull." I need scarcely refer to the additional interest (as a fact in itself) of this arctic gull having penetrated so far south as Mount's-Bay, and of its peculiar value as an addition to our Cornish list of rare birds. The first occurrence of this bird in the British Isles is recorded in the Journals of the Wernerian Society as having taken place in the winter of 1822.

The last of the three unusually rare birds which I take the liberty of introducing to the society, as forming an interesting addition to our Fauna, is the scops-eared owl (*Strix scops*). This little tufted owl, one of the smallest of the family found in this country, was first noticed as a British bird by Col. Montagu. Some few instances of its occurrence are on record; but Mr. Yarrell observes that it is so rare that little has been known of its habits in this country. The bird now under notice was forwarded to me in April last from the Scilly Isles; and Mr. James, the Steward of the islands, informed me that the bird was found in an exhausted state on the grounds of Mr. Smith, at the island of Tresco. The bird was quite perfect in its plumage, and has since been preserved without the slightest injury. In forwarding a notice of the capture of this bird to the "Zoologist," I referred to the beautiful pencilled markings of its plumage; and perhaps, in the arrangement of the different shades of grey and brown, it quite equals in elegance the much admired plumage of our well known nightjar and wryneck. I am in possession of a second example of this bird, which I have no reason to doubt was killed near Leeds, in Yorkshire, and which I beg to present to this society.

On the Egg-purse and Embryo of a species of Myliobatis.

[Plate II., fig. 4, 5.]

By JONATHAN COUCH, Esq., F.L.S., &c.,

MEMBER OF THE SOCIETY.

EARLY in the month of August of last year (1845), Mr. Peach was so obliging as to send me a purse or case of the ovum, of what appeared to be a species of ray-fish, such as I had never seen before, and which he had obtained from a trawl-vessel that had been fishing a few miles south of Fowey.

So little is known of the distinctions of these egg-cases,—so characteristic of the rays and sharks, that it is probable no museum in Europe will be found to contain specimens of even a majority of them; and as the one or two eminent naturalists who have had an opportunity of examining the curious structure of the surface of this specimen were unable to refer it to any of the known cartilaginous fishes, and the accident of finding such an one on a beach may be the only proof of the probable presence of the parent, I have thought it well to give a minute description: at the same time that the specimen itself is submitted to the examination of this assembly of naturalists.

The length of the case is $6\frac{1}{2}$ inches, the breadth $4\frac{3}{8}$ inches; length of the processes, at the anterior angles, $2\frac{1}{2}$ inches—flat, or thin, and tapering to their terminations; but as the anterior border of the case is concave, these tendrils appear simply as elongations of its surface: at the posterior margin it is straight, and consequently the origin of the tendrils is better marked; they are narrower than the anterior, in length $7\frac{1}{2}$ inches, and end in a thin and slender cord. I have seen the purse or case of the common skate (*R. batis*) much longer than this, but in no instance more

than two-thirds as wide; and consequently, in proportion, this is much the widest of any. The longer tendrils, also, much exceed in length, those of any of the rays that I have seen; though they yield to those of the common oviparous shark (*Scyllium canicula*), or that of the large spotted dogfish (*Scyllium catulus*), as represented in Mr. Thompson's figure. But the greater distinction is in the structure of the surface, which, in the cases of all the rays I have examined, is smooth or plain, with a longitudinal direction of fibre. In the present instance the structure is peculiar and beautiful; the surface being thickly set with raised longitudinal rugæ, closely crossed with dots, or raised lines:—that is, each longitudinal line is very thickly studded with raised points, or short lines, which do not pass from one longitudinal line to another, but sink into the minute channel between them. This description, however, applies only to the middle of the surface. Towards the ends and sides the longitudinal lines become joined, and the reticulations form fine and beautiful squares, which are still finer on the borders, but on the extreme margin they disappear. The colour, when I received it, was very dark brown, with deeper tints at the borders. There were a few small serpulæ and flustræ attached to the surface.

Some time after I had obtained this case, I learnt that at the time it was found it contained an embryo; which was subsequently kindly submitted to my examination.

The ovum or yolk, which had been immersed in a bottle of Mr. Goadby's preserving fluid, was as large as an ordinary orange, but somewhat compressed;— the fœtus comparatively small, and consequently far from being fully developed. The mouth is placed far under a projecting snout, which rises into an elevated vertex; eyes large, projecting laterally from the sides of the head; the head distinct, joined to the body by a neck. Pectoral fins with a shoulder, as in the genus *Squatina;* the anterior angle advancing near to the eyes; their outer margin a little sloped, and passing backward in a direction corresponding with the outline of the body: ventral fins small and slender. The situation of the branchiæ well marked dorsally, with five lines showing the number of orifices; branchial fibres long, as in the

early state of other embryotic *Chondropterygious* fishes. The body narrow, with a dorsal ridge that runs down the caudal portion to the end; and at a third of its length from the body this ridge begins to be bordered as with a narrow fin, that seems to decrease again as it proceeds: this caudal portion has also a ridge beneath, which begins close to the vent, and on both sides there is a membranous border. The tail is long and narrow, tapering, but without an obvious fin towards the end.

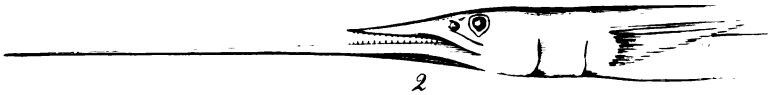
There can be little question that this fish belongs to the genus *Myliobatis* of Cuvier; which is characterized by having the pectoral expansion separated from the head,—that thus becomes exserted, after the manner of the genus *Squatina*, but from which, among other important particulars, it differs in having the mouth placed far beneath the snout. In the adult state, also, it is marked by a small dorsal fin, and close behind it a lengthened spine, situated anteriorly on the caudal elongation. That in an embryotic specimen the dorsal fin should be obscure, is not to be wondered at; for in numerous specimens of several species of the ordinary rays that I have obtained from the egg-case, I have constantly found the caudal elongation to differ much from what is seen in the adult fish; and I believe that all of them are at that period destitute of the ordinary spines.

It is probable that the direction of expansion in the pectorals in this species is various at different stages of growth; or it may be compressed by the walls of the case: for in Mr. Yarrell's figure of what may be supposed the same species (History of British Fishes, vol ii., 2nd edit.), and in one of Gesner's figures, in his Nomenclator Aquatilium, p. 121,—copied from Belon, the pectorals are represented as extended at right angles from the body; while in another the extremity is directed obliquely backward, as it is also in the sketch taken from the present specimen. It may be from this direction of the wings that this fish has been fancifully compared to a bird, and hence is denominated a sea eagle. Ruysch, whose figures are for the most part copies from preceding authors, without being improvements on the originals, but who at Plate 9, fig. 9, has given one tolerably characteristic, remarks that it has been called sea toad, from the form of the head resembling

that creature; and the comparison seems appropriate, from the elevated head, with a protuberant and lateral eye. The same author, from his own authority, says that this fish is viviparous; an assertion which the foregoing account shows to be incorrect.

A very few instances have occurred, in which the *Myliobatis aquita* has been taken in Britain; and I possess evidence of its having been seen in one instance on the Cornish coast: but the circumstance of its breeding here is an unprecedented occurrence; and as the parent fish was not taken, it seems a reasonable ground for concluding that it may be more frequently with us than has hitherto been suspected.

1



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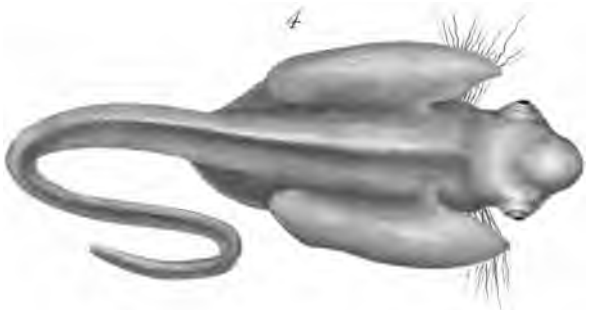

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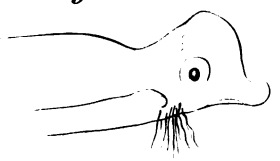

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Remarkable effects of Lightning.

By RICHARD EDMONDS, Jun., Esq.

A SERIES of colours arranged in the most extraordinary manner was produced by lightning on some of the walls and ceilings in the late residence of Mrs. Jones Pearce, at Polmenna, near Penzance, at sunrise of the 13th of Dec., 1846. The electric fluid, after destroying a chimney-stack, descended in different directions through the building into the ground—chiefly along the inside of the stone walls and towards the fire-places—throwing off the plaster in several of the rooms, and breaking more than fifty panes of glass. A portion of it passed through three rooms from one end to the other of a continuous series of copper bell-wires and iron cranks, without breaking any of the plaster, except in reaching and quitting the two extremities of this conductor; the wires, however, were completely burnt, and the resulting metallic colours were cast upon the walls and ceilings in such remarkable forms, that the phenomenon deserves to be recorded.

One of the wires extended from the ceiling of a small room to the floor, by the side of a limed wall, to which it was fastened by small iron staples, which remained uninjured in their places after the combustion of the wire. On each side of this vertical line the wall has been coloured in a most extraordinary manner. It seems as if a double tier of flames, issuing from the wire horizontally right and left to irregular distances, had marked the wall with rays or pencils of various shapes and lengths, ranged over one another on either side of the line, not unlike the leaves on the opposite sides of a fern-stalk. Amongst the vivid colours which

form these pencils, the most conspicuous is a deep purple: and each pencil is edged with pure yellow. The wall has been thus marked from the ceiling to the floor, over a breadth varying from a foot to above a foot and a half.*

On the ceiling of the same room, along the site of another wire, the colouring is still more remarkable, being in fact a spirited picture of a volcano in eruption. A yet more striking picture of this description, on a larger scale (7 feet by 5), is described on the ceiling of the next room into which the wires ran. In each of these volcanic representations, detached masses of rock, or other projectiles, are seen rising in straight lines from the crater, while bright flames of yellow, green, red, and brown, ascend to a considerable height, terminating in a cloud of smoke.

The Sunday morning when this happened, will be remembered also for the unusual depth of snow, which had fallen during the previous day and night; whereby the heavy shower of hail, that instantly followed the lightning, was scarcely noticed. The thunder-storm thus terminating, commenced on the preceding afternoon; when other phenomena occurred so remarkable, that they must be reserved for a separate Paper.

* The writer has presented to the society a painting, in oil colours, of a small portion of these tracings of the lightning, which was kindly made at his request by John G. Moyle, Esq.

Penzance, 12th Jan., 1847.

An account of four Whirlwinds, which passed through St. Just, on the 12th of December, 1846.

By RICHARD EDMONDS, Jun., Esq.

AT one o'clock, in the afternoon of the 12th of Dec., 1846, four whirlwinds or water-spouts were observed approaching the coast north-west of Penzance, in parallel lines in the direction of the wind, then blowing a storm from N.N.E. Three of them having reached the northern shores of St. Just, passed through different parts of that parish, unroofing houses, overturning furze and turf ricks, and carrying along a great quantity of snow, with stubble, birds, slates, tiles, pieces of wood, and other things, caught up in their progress. Sometimes they rushed along the ground like so many clouds of mist without any definite forms. At other times they assumed the appearance of very elongated inverted cones reaching from the earth into the clouds. As they advanced, each column revolved on its axis with varying rapidity, which appeared however to be greatest when the diameter of the column was least. Their progressive velocity was probably between 10 and 15 miles per hour. Large hailstones fell at the time of their passing, and destroyed the glass in a great many windows, the hailstones in and near the town of St. Just being nearly as large as marbles. The fourth, or westernmost whirlwind appears to have swept over a small portion of the land close to Cape Cornwall.

The counting-house of Wheal Spearn was so fearfully shaken by one of the whirlwinds, that those within expected it would have fallen. Richard Pearce, Esq., of Penzance, who was then near it, beheld, only a minute or two previously, a most magnificent electrical phenomenon. At the distance of about a mile S.W. of the

mine, in the direction of Cape Cornwall, there suddenly rose from the sea, or the land near it, to a vast height, a pillar of fire, exceedingly vivid, and apparently of the thickness of a man's arm. On reaching its highest elevation, it spread itself from the top in all directions, with splendid coruscations, followed by a terrific peal of thunder. This form of the luminous appearance renders it probable that the electric fluid passed at that moment from the earth into the clouds, along the axis* of the fourth or most western whirlwind, which must at the time have been near the Cape. The shock in the immediate neighbourhood of that headland was tremendous. Two men, at a considerable distance from each other, were struck to the earth, one of them in a barn, the other on the open common. Nor was it confined to the surface. Underground in Bosweddan mine, near the Cape, the miners felt it severely at the depth of 44 fathoms, the sensation being like that produced by an artificial electric shock: and the thunder of unparalleled loudness, heard by those above ground, seemed to the terrified miners beneath, as the sound of the falling in of the sides of a shaft. It is worthy of remark that the noise thus heard underground was precisely similar to that which is heard by miners beneath the surface during shocks of earthquakes.†

* An analagous phenomenon is described in Rees' Cyclopædia, under the word "Spout."

† Trans. of Royal Geol. Soc. of Cornwall, vol. v., p. 459*.

Penzance, 2nd Feb., 1847.

Complexity in the condition of Animals.

By JONATHAN COUCH, Esq., F.L.S., &c.,

MEMBER OF THE SOCIETY.

IN studying the ordinary condition of living creatures, it appears obvious, that however numerous their natural endowments may be, no single one of them is capable of attaining the highest excellence of its nature by its own unaided powers; and that mentally, as well as bodily, it is not to the advantage of the race that they should pursue the end of their existence in a solitary state.

In the highest class of beings, whatever be the advantage which the mind sighs after, the want is felt to belong more to the mental than to the physical nature; and by a sacrifice of some conveniences on the one hand, and by industry on the other, it is possible that man may advance through the stages of growth, from youth to age, unaided and alone. But such is not the case with regard even to the bodily faculties, in several classes of animals of a lower rank in the scale of existence; there are some that, to cursory examination, appear to occupy an anomolous position, forming exceptions to the regular course of Nature. And yet a deeper inquiry shows that by such a conclusion we give proof of our imperfect apprehension of the order manifest in creation. We suppose the variation to be an interruption of a determined scheme; and, by this misapprehension, presume to conclude that the departure from what we judge the proper line of proceeding, is a defect in Nature.

These observations apply, in an especial manner, to some remarkable circumstances which occur, in the changes that take place in the course of transition of some families of insects from one of their forms to another. These phenomena are so different from the ordinary course of Nature in kindred classes, that they excite doubts as to the truth of facts which observers teach us; and when the accuracy of the observations are established beyond question, it produces the inquiry,—what reason can be assigned, why such caprice has been manifested in creatures which, to our views, might have fulfilled the little duties of their existence in a much simpler manner?

In the latter question there is a tendency to an inquiry after final causes. This, however excellent in itself, would in our present state of knowledge, more frequently mislead or disappoint than instruct the student of Nature. And therefore, without attempting to pronounce that there is an intentional conformity between the natural or bodily deficiencies of these lower creatures, and the modes of supplying them in those of the higher orders; it yet appears justifiable to adduce them as instances of an analogy which creatures of one family, however remote in the order of existence, are found to bear to those of other families. And these links, even when the closer bands of affinity cannot reach them, yet assimilate the apparent discord into an harmonious whole.

Our idea of an animal may be taken from man himself; who in his passage from the condition of infancy to age, has separate duties to perform in every stage:—joys that are congenial to each period, and separate dangers to escape. The proportions of these may differ; for man varies from other animals, in passing through a longer state of pupillage; and there is also assigned to him the period of old age, which is a valuable condition in the system of human life, but which wild animals would find a state of unmixed suffering. But, setting aside these exceptions, his animal life does not differ more from that of other creatures than theirs from each other. So different are the ideas, wishes, and modes of action, of one stage of existence from that of another, that if consciousness could be withdrawn but for an instant, the comparison would scarcely leave him to suppose himself to be the same person.

It is one of the analogies in Nature to which we have referred. The changes which thus pass over man and many other creatures in the ordinary mutations of their lives, and which are comprised in the successive development of organs, with their subsequent inactivity and decay, are in others, of a lower rank, brought about by a process almost resembling a new creation; and which condition, because it appears more perfect, and sometimes lasts for an exceedingly short portion of time, has caused it to be said that their lives are reduced to the very shortest span. Such is the case with the ephemeron fly; and, as many insects enjoy a sportive existence for many weeks or months in the summer, pity has been expressed for the frail condition of a creature which in a very few hours must die either from exhaustion or old age. But it should be remembered that a much longer period of its life has been passed in a state which, to the creature, was not less a condition of enjoyment; and that the short-lived winged condition is assumed only for a brief space in order to accomplish a specific object not otherwise within its powers. The suddenness with which the change is begun and ended, and not the greatness of the mutation, is the chief subject of our surprise and admiration.

The insect genus *Aphis* includes many species, but they resemble each other in their most curious particulars. The *Aphis* is a little obscure fly which would escape attention if it did not sometimes appear in enormous numbers, and show itself capable of inflicting injury on some valuable vegetables, by piercing the skin and sucking the sap. Curiosity could scarcely fail to be excited by the manner of their appearance; for they are commonly found suddenly congregated in situations to which they could not have ascended from the ground; and it is difficult to imagine how they could have arrived through the air, for few, perhaps none that are visible, are furnished with wings. Their habits are inert, and they are as incapable, as they are indisposed, to wander from their situation.

The researches which explained the mystery of the first appearance of this insect developed a series of circumstances still more unaccountable. It was found that, unlike the ephemeron, which assumes its winged condition for the purpose of depositing its

eggs, for in this state only, is it capable of continuing its race, the *Aphis* multiplies its kind only in the wingless or penultimate state; the young ones being produced alive, in a form that differs from the parent only in size. But while through the summer, all the parents for nine successive generations are fertile females, yet when winter is near, the final brood is constituted of both sexes, and eggs are deposited, which endure the cold, and, in spring, produce the broods that again pass through this remarkable process.

There are insects which deposit eggs when in the condition of larvæ or maggots, which is a degree considerably short of the full development of their perfect type, and from which therefore the females never emerge. Mr. Guilding discovered this in a moth of the West Indies, where the female never joined her winged mate in his flight. Mr. Newman has shown the same in the British insect *Stylops;* and the reason must be, that this intermediate condition is not only equal to, but best fitted for, the duty.

In the *Aphis*, it appears that the freshness of perpetual youth is necessary to the production of a continual succession of fertile young. And as this condition is soon passed in each individual, the advantage is secured, by imparting to each one the power of replacing the required condition in a new generation; and thus time at least is multiplied, by compelling a succession of generations to perform the duties of what otherwise might belong to a single individual.

But while *Aphides* require a definite stage of existence for each one to perform this great duty of existence, there are creatures which, beside passing through some changes, in each of which peculiar functions are displayed, divide in their organization the separate portions of what may be termed their perfect condition; and, by this separation of function, are better qualified to fulfil the complex character which constitutes the completeness of their being. The common honey bee is a familiar example of this. The utility and existence of the males are confined to a short period; and it is probable that the masculine organization will not admit of their fulfilling any other function which can be of advantage to the community. But their case affords a singular exception to the ordinary course of Nature, which usually closes

by natural decay the life that is no longer required for the public benefit. The surviving orders in this regal state are so distinct, that they might be thought to be of a different genera of insects; and yet a similar law pervades their nature. The workers are only partially developed, because this condition is sufficiently perfect to qualify them for all their duties; and any additional organization might stand in the way of the uniformity of their proceedings. Of this fact they seem themselves to be conscious, and even appear to appreciate the influences that lead to, or annul it; for when it is judged by the community that their female sovereignty is in danger of being lost, they are able to procure by appropriate nourishment the development from an inferior condition, of what at first sight might be pronounced a distinct species.

A solitary creature must possess the power of supplying all its wants; but the capacity for this is more frequently obtained by limiting the wants than by enlarging the powers. Gregarious animals have more necessities,—beyond the reach of the powers of an individual to supply; they are therefore compelled to divide their efforts, in order that their combined means may secure the advantages of provision and defence, otherwise, out of their reach. Faculties become thus increased by division, and time by the distribution of effort; a few organs, by a difference of direction, being trained to perform work which, under another system, would demand the labour of many. In man, an arrangement like this obtains efficiency in intellectual effort as well as in mechanical dexterity; and it is the converse of the same principle which shows itself in creatures of the lowest level; in some classes of which the individual literally ceases to be a separate being, and its actions are so fused into those of another, as not to be entitled to even the possession of a separate share of vitality.—It forms the principle of vegetation, but is common, also, in the lower marine animals, which consist of agglutinated individuals, that thus form a mechanical analogy with the most lofty attainment of intellectual existence.

List of Lepidopterous *Insects found in the district of the Land's-end.*

By Mr. WILLIAM NOYE,

ASSOCIATE OF THE SOCIETY.

LAST season, an imperfect list was given of the *Lepidoptera* of this district, as far as the *Lithosiidæ;* and a promise was made to extend it to the *Noctuidæ* at some future period; which period it appears is now come.

Before I begin with the *Noctuidæ* I may just notice that I have this season discovered several which belong to last year's list. Of the day-flying *Lepidoptera,—Papiliones,* there have been discovered *Thecla rubi* and *Thymele alveolus,* both in Trevayler bottoms; the former in moderate abundance, but only a single specimen of the latter. It was rather late in the season for either, or I might have been more successful, for they were old specimens. Mr. Curnow has also taken single specimens of *Polyommatis agestis* and *Pamphila linea,* which species I have not been fortunate enough to discover; though I believe, from the geographical distribution of the insects, that they are very likely to occur here. Beside the rare and beautiful *Deilephala livornica,* whose capture was noticed in last year's Report, *Deilephala galii* has been captured, twice at least, by Dr. Leach, according to Stevens' "Illustrations of British Entomology." I think if the members of our Society were to narrowly watch opportunities themselves, and desire their friends to do so likewise, and preserve every specimen that falls under their notice, these beautiful insects would be captured now as well as thirty or forty years ago. Gentlemen's gardeners might do much in preserving such specimens as must frequently occur to them, but strange to say, with very few exceptions, these persons never see an insect.

During the past week, I have received a very fine specimen of that rare sphinx, *Deilephala celerio*, which, though not taken in our own district, was captured in the western division of the county. We know not what rarities our narrow neck of land may produce till we explore it. Mr. George Fox, of Rose Vale, has contributed much towards the Society's collection, by saving such specimens as fell in his way.

Besides the above-mentioned species, Messrs. Fox have seen either *Sesia bombyliformis*, or *fusiformis*, or perhaps both, hovering over the flowers in their gardens. *Lithosia complana* was captured this season at Rose Vale.

Mr. Couch has found the larva of *Cossus ligniperda* in his garden.

NOCTUIDÆ.

Triphœna orbona ..... Occurs plentifully in June and July.

——— *pronuba* ..... In the same months as the former: this is a very variable species.

Cerapteryx graminis ... This has been taken in St. Just,—the only locality I have heard of in the West of England; it frequents high grounds; found in June.

Agrotis segetum..... This abundant species occurs during the summer months; it is very variable, scarcely any two specimens being alike; it has been by some authors multiplied into no less than nine species.

——— *suffusa* ..... This occurs in April and May, and again in August and September; it appears to be pretty generally distributed.

——— *puta* ..... I have taken this insect in May, but not abundantly.

——— *tritici* ..... This species occurs in June, in potatoe fields.

——— *exclamationis*... This is abundant during the months of June and July, and appears to be so everywhere.

Graphiphora C. nigrum. This has been taken in June and July, but I never found it in very great abundance.

——— *plecta* .... This I have found somewhat plentifully from May till August.

Orthosia pistacina * .... A single specimen taken by Mr. Curnow.

Mythimna lithargyra .. I captured a specimen of this rare moth in July last, in St. Just.

——— *turca* ..... Captured the same night, and in company with the preceding species.

Segetia xanthographa .. Summer months; not rare.

Caradrina cubicularis .. A generally distributed species, occurring in June and July: common.

Xylina putris ..... Appears in June and July; not very abundant.

Xylophasia lithoxylia... I have occasionally taken this species in July, at St. Just.

——— *polyoron*.... In June, July, and August, an abundant species.

Hadena lithoriza ..... Occurs in April and May, but scarce.

——— *cucubali* ..... I have taken this species very frequently in June and July

Heliophabus popularis .. I took a specimen of this insect on the 6th of September, attracted by light; it is the only specimen I have taken in this district.

Mamestra pisi ..... This species appears in June and July; it is not rare.

——— *oleracea* ..... Occurs in June, July, and August: an abundant species.

——— *brassicæ* ..... This is one of the most abundant of all the *Noctua*, being common during the summer months.

Euplexia lucipara..... In June and July; not common.

Hama testacea ..... In Autumn; rare.

Apamea oculea ..... In July, August, and September; very abundant.

Scotophila porphyrea ... This handsome insect occurs on heaths, but not in abundance; I have never taken more than two or three specimens.

* I have not taken any of the *Orthosia* at St. Just, but think that, as some of the species are common in other localities, some might yet be found. The season of their flight is early spring and autumn.

Polia serena ..... I had a fine specimen of this pretty species given to me last season that was captured here: it occurs in June.

Acronycta psi ..... This species occurs in July and August in abundance.

——— *meneanthydis*. In June; not very abundant.

——— *rumicis* ..... From May till August, in abundance.

Briophila glandifera ... Occurs in some plenty in June and July.

——— *perla*..... Appears in the same months as the preceding species.

Scoliopteryx libatrix.... This is a common and beautiful species, occurring in June and September.

Leucania straminea .... Appears in June and July in great numbers.

——— *impura* ..... In the same months as the preceding, in abundance.

Phlogophera meticulasa. This is an abundant species. I have found this insect from January till October.

Cucullia verbasci ..... I never captured this species, but have bred it in abundance from the larvæ, found on the *Scrophularia nudosa* and *Verbascum thapsus:* the perfect insect appears in May.

——— *lactuea* ..... Appears in July; not very rare.

Abrostola urticæ ..... Flies in June and July; common.

Plusia iota ..... Found in July; not common.

——— *percontationes* .. Found with the former; not rare.

——— *gamma* ..... An abundant species, occurring from April till October, in some seasons in countless myriads.

——— *chrysitis* ..... In July, amongst rank herbage, by road sides, and unfrequented lanes.

Heliothis peltigera ..... Three specimens of this species were taken some years since, in a meadow on Newlyn cliff, in the autumn, by Mr. Curnow.

Mormo maura ..... This fine insect occurs in June and July, and is not rare.

The foregoing list must still be considered as very imperfect, and I have no doubt but that twice the number occur in the district, but we are in want of more collectors to detect them.

I had great expectation of taking many good *Noctua* with sugar this season, but I have not had one night in which I could satisfactorily attend to it.

I hope to get a collection of *Neuroptera* against another season: many of the species I have by me in store boxes.

I respectfully again urge the necessity of the members exerting themselves to secure and save every insect which falls under their notice, believing that if this be done, in a very few years the society will possess a good collection of local insects; while I have pleasure in saying that my own exertions shall most cheerfully be devoted to the society.

The following observations on the Death's-head moth were accidentally omitted at page 125:—

In our own country, it has been discovered that the sound is emitted by the pupa before the emersion of the moth; this was first noticed by the late Mr. Raddon. I have now a living pupa which very frequently emits the sound, but not so sharp and distinct as the perfect insect.

The larva also produces the noise; this fact was first noticed, and pointed out to me, by my friend Mr. Couch, who discovered it in a specimen sent him from Scilly, in August last.

During the next season, I intend to examine as many specimens as possible, in conjunction with a gentleman who is acquainted with delicate anatomical operations, and I am very sanguine that my labours will ultimately be crowned with success.

WILLIAM NOYE.

St. Just,
Sept. 14th, 1847.

On the cause of the recent Oscillation of the Waters in Lake Ontario.

By RICHARD EDMONDS, Jun., Esq.

"On 20th Sept., 1845, was witnessed a singular phænomenon on Lake Ontario. In the afternoon, the waters suddenly moved, in a mass, out of the rivers, bays, coves, harbours, &c., lowering the water to different depths in different places. In 10 or 12 minutes the waters returned and rose to a higher level than they had before. This oscillation, or efflux and reflux, was repeated several times at about the same interval of 8 or 12 minutes. At the mouth of the Genesee river, 7 miles from the city, the water fell 2 feet below its common level and soon rose as much above it. At Oswego, 70 *miles east* of this, a large body of logs moved out into the lake, to the great annoyance of their owner, till he saw them soon returning to their previous location. At Cobourg, *a little west of the Genesee*, and on the Canada side of the lake and *distant about* 60 *miles*, the same fall and rise were observed to be repeated, the greatest being a little before sunset, when the waters rose to their highest point, or about 2 feet. At Port Hope, a few miles west of Cobourg, the steam-boat, Princess Royal, ran aground as she attempted to enter the harbour, so much had the water lowered in the port."

Jameson's Edinburgh Journal,
for April, 1847, p. 295.

Professor C. Dewey attributes the phænomenon above described to a tornado "about three-fourths of a mile wide, which passed that afternoon over the" centre of the lake, from S.W. to N.E., attended with waterspouts, "large hail, and lightning and thunder." "The power of this tornado (he says) was probably sufficient to withdraw the waters from the shores, so as to produce the efflux and reflux." But he does not explain how such an effect could have resulted from such a cause; nor does he say why the numerous tornadoes and waterspouts which traverse the American lakes do not generally occasion similar oscillations.

It seems to me much more probable, that during the tornado, the upward shock of an earthquake occurred throughout the basin of the lake, whereby a considerable body of water resting on the inclined plain descending from its shores, was driven towards the centre; thus producing the *efflux* with which the oscillation commenced. It is no objection that such supposed shock was unperceived above the level of the lake, for shocks often "follow the

course of the shore," * without rising to higher levels. Had the oscillation begun everywhere with an *influx*, it might be accounted for by supposing that the sides of submerged rocks or shoals near the centre of the basin had vibrated, in directions towards its circumference, and that the shock, on reaching the margin of the lake, caused a quantity of the water there, proportioned to the momentum of the shock, to rush up the beach, in the same manner as a smart blow at the lower end of a line of marbles in a long tube, causes the marble or marbles at the higher end instantly to fly up, while all the others remain stationary. A shock of this description is attended with no upheaving—no subsidence—no displacement of any portion of the ground, but is a mere vibration transmitted through the sea with as great velocity and by the same laws as through a solid body. Now, if a shock or rapid vibration of the deep bed of the ocean can, when *transmitted vertically*, strike a ship with such violence as to make all on board believe she had suddenly struck on a rock—an occurrence very frequent during earthquakes; and if (as was the case in 1755 with a ship 40 leagues west of St. Vincent) the concussion has been so great as to throw the men "a foot and a half perpendicularly up from the deck," † surely the same power, if *transmitted obliquely*, in the direction of a shelving shore, would be sufficient to drive the marginal water a considerable distance up the beach.

* Humboldt's Personal Narrative, pp. 222, 224. † Lyell's Geology, vol. ii., p. 241.

Penzance, July, 1847.

An account of the extraordinary Agitation of the Sea in Cornwall and Devon, on Sunday the 23rd of May, 1847.

By RICHARD EDMONDS, Jun., Esq.

THE extraordinary agitation of the sea along the southern coast of Cornwall on the day above mentioned was greater, and of longer continuance, than any that had previously occurred during the last fifty years.

It was noticed in Mount's-bay as early as 5 o'clock in the morning, and continued with varying intensity throughout the day. It attracted, however, most general attention about 5 o'clock in the afternoon, when the sea, near the time of low-water, rushed into all the tidal harbours of the bay, to a perpendicular height varying from about 3 to above 5 feet, and then returned to its previous level, occupying about fifteen or twenty minutes in this double movement. A similar influx and reflux immediately succeeded, and the sea thus continued to advance and retire until after midnight: but at what hour the rise and fall were greatest I have not been able to ascertain. The motion resembled that of a very strong tide, or rapid river, eddying and foaming in a most extraordinary manner. Large boats, from which the tide had completely receded, were again floated and left dry, while the bows of those moored in deep water near Newlyn were, by the alternating current, whirled every eight or ten minutes to opposite points of the compass, the wind, although fresh, having little or no influence upon them. Persons attempting to pass the causeway leading from Marazion to St. Michael's Mount were overtaken by the unexpected influx and narrowly escaped being swept away. The sea all the day was quite smooth, and apparently undisturbed except near the shore where the agitation prevailed

At Plymouth, during the whole or the greatest part of the day, the sea, from the mouth of Catwater to within Sutton Pool, was strangely agitated by an almost constant flux and reflux, although

there was scarcely any wind. But in the evening, especially from half-past 7 to 9 o'clock, the commotion was still more alarming; and the crews of the trawlers were obliged to remain on board all night, as their vessels were whirled in opposite directions by every change of the current, and several of them damaged by running foul of one another. The bores were the most formidable remembered by the oldest inhabitant.

In Falmouth harbour and the Scilly Isles, similar oscillations occurred. But on the north coast, at least in St. Ives bay, nothing unusual was remarked.

The cause of these phænomena I have endeavoured to explain in a former communication.*

The temperature at Penzance on this day was much higher than it had been for the year, and the sun shone powerfully until about three in the afternoon, when the wind, which had been about S.E., suddenly changed, and blew strong from W. or N.W., with every appearance of an approaching thunder-storm. A few large drops fell about half-past five, and distant thunder was frequently heard during the evening. The heat and electricity of the air this morning in London were unusually great, the thermometer there being 87°: at Chiswick it was 89°, and "very hot and sultry." The barometer in Marazion this day, at 3 p.m., was at a minimum of 29·67, being lower than for five days before and twenty-one days after, except at the same hour of the following day, when during a storm it reached a minimum of 29·62.

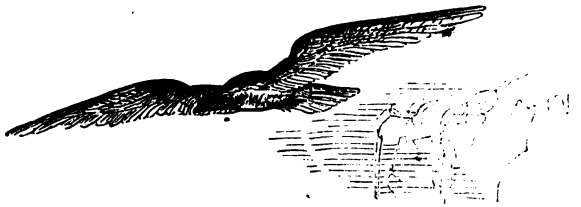
In the night preceding the phænomenon above described, two of the Coast Guard of Mount's-bay, while standing on the cliff between Newlyn and Mousehole, felt a slight motion of the ground, and repeatedly heard a sound like that of distant thunder.

It is remarkable that all the earthshocks and extraordinary oscillations of the sea in Cornwall during the present century whose dates are known (and they are ten in number†) have, with only one exception, happened nearer to the moon's first quarter than to any other. The exception is the shock in the east of the county on the 20th of October, 1837, the day before the moon's last quarter.

* Ante, p. 105.

† The dates of the shocks are,—30th December, 1832; 20th October, 1837; 21st January, 1839; 17th February, 1842; 22nd May, 1847.

The dates of the oscillations are,— 5th July, 1843; 30th October, 1843; 5th July, 1846; 1st August, 1846; 23rd May, 1847.



PENZANCE
Natural History
AND
Antiquarian
SOCIETY.

REPORT

FOR MDCCCXLVIII.

ESTABLISHED IN 1839.

Penzance:

PRINTED FOR THE SOCIETY,
BY F. T. VIBERT.

PROCEEDINGS OF THE GENERAL MEETING

OF THE

Antiquarian & Natural History Society

OF PENZANCE,

HELD IN THE TOWN COUNCIL ROOM, 7TH OF OCT., 1848,

The Worshipful the Mayor, RICHARD PEARCE, ESQ., V.P., in the Chair.

The Chairman, in opening the business of the meeting, remarked that he regretted being called to the chair on the present occasion, as it arose from the continued indisposition of our excellent president, Joseph Carne, Esq., whose absence they must all regret. However great his deficiencies might be in the situation in which he was placed, it afforded some satisfaction to see around him persons on whom he might venture to draw at sight. He then alluded to the beautiful models of the carns and cromlechs, which had been made a present by two ladies members of our society, and to the deficiency of accommodation which we could afford for their reception, and hoped that the time was not far distant when we should be able to supply a building which should be worthy of our county, and an ornament to the town.

The Report of the Council having been read and adopted, the following gentlemen were elected officers for the ensuing year:—

President.

Joseph Carne, Esq., F.R.S.

Vice-Presidents.

Rev. C. V. Le Grice. | J. J. A. Boase, Esq.
Richard Hocking, M.D.

Council.

J. Batten, Esq.	J. Flamank, Esq.	R. Pearce, Esq.
A. Berryman, Esq.	J. Montgomery, M.D.	J. Pentreath, Esq.
W. Borlase, Esq.	Rev. C. Moore.	Rev. M. N. Peters.
T. Darke, Esq.	F. Paynter, Esq.	J. P. Vibert, Esq,
		L. R. Willan, M.D.

Treasurer.

Richard Long, Esq.

Secretaries and Curators.

E. H. Rodd, Esq. | J. N. R. Millett, Esq. | R. Q. Couch, Esq

DONATIONS TO THE SOCIETY

FOR 1848.

DONORS.	SPECIMENS.
Misses Louisa & Matilda Millett.	Four models of ancient monuments in the neighbourhood of Penzance.
Mr. Colenso	A white robin, from Scilly.
Mr. J. N. R. Millett	Siskin.
Mr. J. Prockter	A Launceston shilling.
Mr. W. Bazely, *St. Ives*	A variety of sparrow.
Miss Eliz. Martin	New penny.
Miss Mary James	Half farthing.
Miss M. Beare	Montreal halfpenny.
Mr. H. Pascoe	Black rat.
Mr. James Kelynack, *Newlyn* .	A lump of resin, having the appearance of a boulder of granite, dredged up 18 miles S.E. of Land's-end.
Mr. Michell, sailor, of *Newlyn*.	Head, skin, and feet of albatross, from Cape of Good Hope.
Dr. Johnston.....	Crapauds, from West Indies.

REPORT.

IT is with feelings of great pleasure that the Council can again congratulate the society on the steady progress made, during the past year, in almost every branch of its labours.

At our last annual meeting, the council had to report the first attempt made by the society of pursuing the Antiquarian department of its duties. At that time it had the pleasure of directing attention to three beautifully executed models of antiquities found in our neighbourhood. These were executed and presented to the museum by two ladies (Misses Louisa and Matilda Millett), members of our society. During the past year their exertions have been continued, and the exquisite models now laid on the society's table have also been executed and presented by them for our acceptance: these, with the others previously given, will be deposited in our museum, and will be lasting records of the antiquities they represent as they existed in 1848. All the single monuments are made according to scale, the proportions of which are affixed to each: the larger are made so as to convey a correct impression of their form, size, and character; but the minute measurements of the separate stones are from necessity omitted. The council cannot speak too highly of the value of these donations; and it is therefore with regret that it has again to refer to

the smallness of the space that can be allotted to them. The council feels imperatively called on again strongly to urge on the attention of the society the necessity that now exists for the enlargement of our museum. It is no idle complaint; for many valuable additions, which would be made to our collection, are withheld, solely from our inability to afford them appropriate accommodation.

ORNITHOLOGY.

The ornithological branch of our society has not been without some points of great interest during the past year. Though not pursued so energetically as formerly, yet it is hoped that the interest generally felt for this branch of science, in a locality remarkably favourable, from its insular and extreme westerly position, as well as from the practical attention which several of our townsmen are disposed to render to it, will prevent any varieties from being passed unnoticed.

The most interesting examples of rare birds discovered in this neighbourhood since the last annual meeting are,—the white stork (*Ciconia alba*); the continental white wagtail (*Motacilla alba* of Linnæus); the grey-headed wagtail (*M. neglecta*); yellow wagtail (*M. flava*); Temminck's stint (*Tringa Temminckii*); and spoonbill (*P. alba*). The white stork is not only a valuable addition to our local *Fauna*, but its capture in any part of England may be regarded as very interesting. The council is not aware of any recorded instance of its being before noticed as occurring in Cornwall; and being a very rare British bird, its value in the present instance, as forming a subject for record in your council's report, may be easily understood. The true *Motacilla alba* of the Continent, which till of late years was supposed not to belong to the British Islands, has during the last summer been found in considerable numbers in the immediate neighbourhood of Penzance; and, about the same period, the male and female of another rare species of wagtail (*M. neglecta*) were obtained. The occurrence of Temminck's stint (*Tringa Temminckii*), and of the spoonbill, also deserve a place in the ornithological report of the society; for although the occasional capture of both species have within the

last few years rendered the notice of examples less remarkable, still the actual occurrence of birds of acknowledged rarity and interest from time to time in our locality will, it is hoped, be an incentive to perseverance in following up this department of natural history.

ICHTHYOLOGY.

The council has great pleasure in remarking that in the department of ichthyology the society has been more than ordinarily successful: several rare fish have been examined, and the habits of the most important have been recorded. The migrations of the mackerel have been extensively noticed, and the results have been laid before the society at a monthly meeting.

The plain bonito (*Auxis vulgaris*) has been captured in Mount's Bay during the past year. This, though an exceedingly rare fish, the council has the gratification of informing the society that it is the second opportunity it has had of recording its appearance within the sphere of our labours. The council would remark, that while the first taken was, as its name implies, of an *uniform* black-blue tint, yet that the specimen taken during the present summer was marbled like the common mackerel, though much more obscurely. The council has had an opportunity also, during the past year, of examining a specimen of the coronated lump-fish (*C. coronatus*), a rare species, supposed to be distinct from the common lump-fish. After a careful examination, which fully confirmed the description given of it, the council is of opinion that it is but the young of the common species. An accurate description is taken, and the fish is preserved for further reference. The oblong sun-fish, and a fine specimen of the pilot fish, have also been taken during the present summer, the latter of which is now on the table to be placed in our museum.

In addition to these, the council has the great pleasure this day of laying before the society a figure and description of a mackerel, not only new to our county, but one which has never before been noticed by naturalists. It has been examined by a member of our society, who has communicated the discovery for publication in our report.

From the great importance of the pilchard to the interests of the county, the council has continued its attention to its migrations. During the past winter they occupied an unusually close position to the shore, and when they began their migrations they moved into deeper water, where the bulk of the shoals have hitherto remained: a few of the smaller ones approached the shore, but the masses passed the Lizard in an easterly direction, swimming very deep.

CONCHOLOGY.

Several additions have been made to our land and fresh-water shells within the last year. A list has been laid before the society by the same young gentlemen who presented the collection to our museum at our last annual meeting. The additions since made to that list during the past year are,— *Carychium minum; Pisidium pusillum; Helix aculeata; H. fulva; Vertigo pygmea; Planorbis imbricatus.*

ENTYMOLOGY.

Mr. Noye has continued his exertions in the department of entymology, and many rare and valuable insects have been added to our *Fauna:* it is to be regretted that we are likely soon to lose his valuable services.

CRUSTACEA.

Among the *Crustaceans,* we have one new species to be added: this is not only a novelty to the county, but to the kingdom. It is a species of *Grapsus,* and was taken below the Baths in Mount's Bay. The recognized species on our coast is *G. Linneana,* and that is so rare, that but little is known of its history, or habits. Several species inhabit the *Sargasso* or gulf-weed, but the Cornish species was found amid the roots of the *Laminaria digitata,* the common sea-weed of our shores. The *Portunus variegatus,* new to the Cornish list, has been taken in St. Ives Bay, and the metamorphosis of the *Crustacea* have been extended to the hermit crabs by a member of our society.

BOTANY.

The botany of our district has not been so extensively examined as the council wished it to be, and as it hopes it will be during the next year; but the following species have been added to the already published list:—

Gentiana campestris and *Scleranthus annuus*, at the Gurnet's head;—the last is very common in most parts of England, but is rare here; *Scirpus Tabernæmontani*, at the upper pond of Trengwainton; *Innula crithmoides*, on the Crown rock at Botallack; *Veronica polita*, in Trannack lane, and *V. scutellata*, on Chyanhâl moor; *Rhynchospora alba*, at Lower Tremenheere; *Orchis pyramidalis*, between Lelant and St. Ives; *Nasturtium sylvestre*, at Hayle; *Malva rotundifolia*, in Alverton lane, and *Trifolium fragiferum*, in the Marsh at Lariggan Bridge; and a new habitat for the fern *Asplenium trichomanes*, in the road-side at Trevayler.

While the council records the above discoveries in our district, it would beg especially to call the attention of the society to the publication, by a member of our society, of one of the most valuable contributions to botanical science that has taken place for many years. It is a work on microscopic *Algæ*, a branch of investigation almost created by its author; and it is remarkable for the extent and accuracy of its research, and for the beauty of its illustrations; and for which we are also indebted to a member of our society.

ZOOPHYTES.

Researches among the *Zoophytes* have been carried on by some of our members, and many additions have been made to our local *Fauna* during the summer. Among others, the most interesting are,—*Alecto major*, *Crisea geniculata*, *Laomedea obliqua*, and several species of *Actinea;* and numerous observations on their anatomy and physiology have been made. A communication on this subject will be brought before the society at the present meeting.

From the extent of our labours during the past year, and the hope that they will be still further extended during the next, the

council hopes that many who hitherto have exerted themselves but little, will render their assistance to the more active members of the society.

With our increasing exertions, the objects desirable to preserve are also increasing, and the council would once more remark that there is a necessity for the society to take measures to facilitate the accomplishment of preserving specimens of all our productions.

EDWARD HEARLE RODD,
J. N. R. MILLETT,
R. Q. COUCH,
} *Secretaries.*

Oct. 7th, 1848.

AN ADDRESS

DELIVERED BEFORE THE SOCIETY AT ITS ANNUAL MEETING;

By RICHARD Q. COUCH,

ONE OF THE SECRETARIES.

IT was my wish, on the return of our annual meeting, that the task of addressing you should have been assigned to another; not that my attachment to the society is less than it was, or that the interest I have always felt in the objects of its pursuits is on the wane; but from having on several previous occasions performed this duty, I felt desirous of giving place to another,—of enlisting others into the active departments of our society. I have, however, been again requested to resume my old position, and I cheerfully obey.

Our pursuits embrace the history, habits, and physiology, of the whole of the vital creation by which we are surrounded; and investigations into the origin, character, and uses, of the monumental records of the ancient inhabitants of our county. The extent of our researches are therefore sufficiently extensive for the most enlarged and philosophic mind, and I hope are sufficiently interesting for others to join us in the pursuit. The inducements offered to entice us to the study of Nature, are not only great, but perpetual; ever changing and ever beautiful. Not only do we find that different climates offer us different characters, but that each can persuade us with new beauties from day to day, and present us with phenomena worthy of our deepest thought. And thus our wanderings, which of themselves would be but the mere

idle pastime of the hour, will, when accompanied with the intelligent contemplation of surrounding objects, become the means of the most sublime instruction, and, if I may be allowed to say so, of adding new pleasures to our existence. These pleasures will meet us, not only in our most retired walks, but present themselves to our notice amidst the most exposed and sterile wastes.

The productions of Nature are suited to all tastes and to every disposition. The botanist and zoologist may each find sufficient subjects for research; whether we refer to the mere collecting and preserving their external configurations, to their habits, or to the more obscure phenomena of their histories and developements. The botanist may examine the stately oak, and step by step descend to the more humble, but more graceful, hedge flower, and even still further, to those strange inhabitants of our stagnant bogs, but lately discovered by a member of our society. The zoologist may view the cumbrous whale, or dwell with admiration on the elegance and beauty of the finny inhabitants of the deep; he may contemplate with delight the feather-like corals of our shores,—the jelly-like structure of our medusæ; he may expatiate on the gracefulness of our birds, and admire the brilliancy of our insects; but he knows that these are but the separate entrances to investigations far more interesting and beautiful. The grand, the graceful, or minute, may arrest our attention; but when it is discovered that each creature occupies a definite position in the scale of being, and that each is admirably adapted to the position it occupies;—that modifications and alterations of different organs are but so many accommodations to peculiarities of habit; the mind, though pleased, is not satisfied till it has sought earnestly into the laws by which such wonderful changes are produced. In this search, it will be seen how beautifully one creature is linked to another; that genus follows genus, both in similarity of form and habit; that the most simple leads to the most complicated with order and regularity, throwing off a thousand offshoots, by which the different orders become united in the bonds of affinity. The extinct creations of former conditions of our globe join the general strain, till all nature arises in its magnificence, and asserts to every inquirer, the harmony of its proportions and the wisdom of its Designer. It will assert,

that the organization of each creature is for ever fixed; and it will also assert, that the idea that it is capable of revolution by circumstances of habit or position, to be the mere phantom of a puzzled brain. Such investigations of Nature as these, by which the laws of analogy and affinity are traced,—the anatomy and functions of different organs are elucidated, require the highest orders of mind, and almost undivided attention. It cannot be expected that the members of this society can enter on such subjects with either the success or zeal of a professor; the active engagements of life are incompatible with such abstruse studies: but we can each of us accumulate facts, record our observations, and offer them to those whose peculiar province it is to develope the laws by which Nature is governed.

We have remarked more at length, on a former occasion, that all Nature is connected by a graduated order of beings, and that harmony of form is one of its most remarkable features; but it may now be asserted that there is not only harmony of form, but harmony of habit also. The gradation of habit appears to be as perfect as the gradation of developement, though one is not so fully ascertained as the other. The entire character of *form* is brought under investigation each time that a creature is examined; the whole evidence of its affinities are concentrated and presented to the mind at one view; and this too, as often as it is desired. Not so with the habits and instincts: they can be examined only in detail, and at distant intervals. They require long and continued observation, and an intimate acquaintance with the creatures themselves in a natural and unrestricted state. A single trait of character is frequently all that is offered to the mind at once, and this perhaps may never again be repeated. It is beyond the possibility of one person continuously to observe and study such phenomena with any thing like certainty and satisfaction; but assisted by others, and having the records of past generations at his command, he can concentrate the evidence, and work out the result with as much precision as is effected in the other departments of science. It is one of the duties of our society to record such facts, and treasure them up for future service. Under such a discipline the most obscure phenomena must yield their intelligence, and afford

it is certainly within our power to observe particular traits of character in the creatures around us.

While we should not neglect to record the appearance of any rare visitor to our province, we might also study the habits and economy of our more common productions. The habits of animals are as specific as the markings of their body; variations of anatomical conditions are indicative of variations of habit, and it only requires extended observations and records to elucidate this important subject. We are all familiar with the gradations evinced in the eagle, feeding on its living prey, to the vulture, gloating over its putrid meal;—the noble boldness of the lion, to the sneaking viciousness of the tiger. Nature, never acting by starts, has implanted on all the kindred species the intermediate characters leading to these extremes. But we need not seek for illustrations from creatures so entirely removed from our observation, nor need we select such creatures of our own country as can be examined but by few. Instances of remarkable intelligence are to be found occurring in most creatures; and it will also be found that all possess a power whereby they can accommodate their actions to the exigencies of their positions. The common grey mullet of Mount's Bay is a familiar instance of such a capability. Enclosed in the net, it becomes bewildered, and seeks an escape with the greatest irregularity. Aware of its position at last, the care and precision with which it seeks its freedom is very extraordinary. Resting at first, as if to form an estimate of the nature of its prison, it then carefully examines every portion of the net, from the corks to the leads, and if a hole be found it tries to effect an escape. Failing in this, other means are attempted; it essays to lift the loose net and leads from the ground, and in doing it many are frequently destroyed. All these resources having failed, it next attempts to fling itself over the head-ropes and corks, and in this it frequently succeeds, and if so, all the others follow in rapid succession. Aware of this, the fishermen, to secure their prize, float straw along the inner margin of the buoy: by this method the fish are deceived and fall again within the boundary of the net. Here we see the adaptation of means to an end, under circumstances which can hardly occur twice in the life of the same

creature, and which therefore experience could not have taught. The habits of the bee and the ant have in all ages excited the interest and wonder of observers; but we are not more astonished at the order and regularity of their usual economy, than at the skill they evince in meeting and overcoming the accidents of their lives. It is not a matter of great importance on the present occasion whether we refer these actions to reason or to instinct; our object being to show that the habits of the creatures around us offer us extended and interesting subjects for investigation, rather than to advocate any theory. There are persons, however, who blinding themselves to these the true objects of our pursuits, represent us as mere loiterers over knowledge, occupying our time in pouring over the dry details of some obscure subject, while the more useful occupations of society lie in a great measure neglected. It must be remembered, however, that natural history and antiquarianism are but the occupations of our leisure hours—the occupations of minds relieved from the turmoil of business. And what, I would ask, can be more worthy of our leisure occupation than the contemplation of the vast variety of Nature scattered around, and all designed to some great end? or what can be more interesting to the historian than the examination of those monuments of our county, which convey us back into remote antiquity? If with these, we associate reflections on the manners and customs of the periods of their erection, as we undoubtedly should do, the subject immediately glows with interest, and becomes as instructive as the maxims of the most celebrated sages of antiquity. Apply the same test to the leisure pursuits of those who deridingly ask such questions, and what would be the reply? If their moments of relaxation are more profitably employed than our own, we will allow them the privilege of administering a reproof, but not till then.

We have no desire unduly to elevate the importance of our investigations, but as a branch of natural philosophy—a branch which embraces the whole economy of vital creation, including even man, it is as worthy the attention of our highest faculties as astronomy itself. Creation must be viewed as a whole; and though one department may be more elevated than the others, yet

all are important in the history of our earth. Such generalizations as are here indicated constitute the highest attainments of the science, and can be attained but by few: these must be the result of perfect generalizations—the product of the accumulations of facts.

But there is another view of the case, by which natural history may be useful even in daily life. The agriculturists are frequently invaded with pests which either injure or destroy their crops: year after year do they expend their capital in manures which they consider capable of meeting their wants, and year after year are they deceived. The wire-worm is noticed by them as existing, only because of its destructive habits, and in its destruction they are powerless: it is known only to be dreaded. It has ever been so, and the farmer seems as far from extirpating the evil as ever. The poor blind mole is also known only as an enemy; it is surrounded by a host of prejudices, and each tends to the destruction of its life. Not only does each agriculturist do his utmost for its extirpation, but he hires to assist him such as make it the engagement of their lives. The chief proofs of its injurious propensities are the elevation of mole-hills on the grass land and growing crops, and the undermining of the surface-ground. Are our agriculturists such ardent admirers of neatness—are they so exquisite in their tastes, that a mole-hill can so seriously offend their eye? If they would but examine the stomachs of the moles they take they would find them filled with the wire-worm, or such insects as are highly injurious to their crops, and it is in pursuit of these that they form their subterranean galleries. If the mole should be allowed uninterrupted occupation of a field for about two or three years, we should hear but little of the destructive wire-worm, or equally pernicious cockchaffer. And it is worthy of especial note, that no sooner does the worm disappear than the mole seeks other feeding-grounds. One is the antagonist to the other, and in attempting to destroy both the surest plans are laid for a continuation of the evil. Insects, though small, and when in the usual quantities, are insignificant, yet when they congregate in vast multitudes, as they sometimes do, they become as destructive as a pestilence or a famine: our cattle are tortured, our crops are devoured, and whole countries are laid waste. Most of us can recollect how completely

the turnip crops of this kingdom were a few years ago destroyed by the black caterpillar, and how fruitless were all our attempts to arrest their progress. How can we meet these evils so effectually as by studying the nature of their habits?—By so doing we are placed in the best position for applying our remedy. If the habits of all the creatures around us were carefully ascertained, the farmer would save his capital and his anxieties; and he as well as others would look with more interest for the success of our pursuits.

But while natural history thus bears on the pursuits of man, there are other and higher objects, which claim the attention of the philosopher. So beautifully are all the objects of Nature adapted to particular ends, that the mere fragment of a bone or a tooth is sufficient to convey the idea of the character of the creature to which it belonged; and it is by this that we shall eventually be able to read the early history of our globe, for natural history bears an important part in all geological investigations. The permanency of the laws of Nature counteracts the extinctions and diversities of form. The star-fishes of our Bay are some of them, in their younger state, the representatives of creatures which abounded when our world was young. The creatures themselves are all but extinct, but formerly they were among the most numerous of the ocean's inhabitants. *For miles and miles we can walk over the stony fragments of the *Crinoideæ;* fragments which were once built up in animated forms, encased on living flesh, and obeying the will of creatures among the loveliest of the inhabitants of the ocean. Even in their present disjointed and petrified state, they excite the admiration, not only of the naturalist, but of the common gazer, and the name of stone-lily, popularly applied to them, indicates the general appreciation of their beauty. To the philosopher they have long been subjects of contemplation as well as of admiration: in him they raise up a vision of an early world,—a world, the potentates of which were not men—of seas, on whose tranquil surface myriads of convoluted nautili sported, and in whose depths millions of lily-stars waved gracefully on their slender stems. Now, the nautili and lily-stars are almost gone: a few

* Forbes's *Echiodermata*, p. 2.

lovely stragglers of those once abounding tribes remain to evidence the wondrous forms and structures of their comrades. Other beings, not less wonderful, and scarcely less graceful, have replaced them; while the seas in which they flourished have become lands, whereon man in his columned cathedrals and mazy palaces emulates the beauty and symmetry of their fluted stems and chambered cells. It is to no visionary studies, therefore, that we invite you, but to the contemplation of stupendous facts,—studies which will carry us back into the most remote antiquity of our earth—when it was fresh and young, and will show us that at the present time it is as fresh and beautiful as ever.

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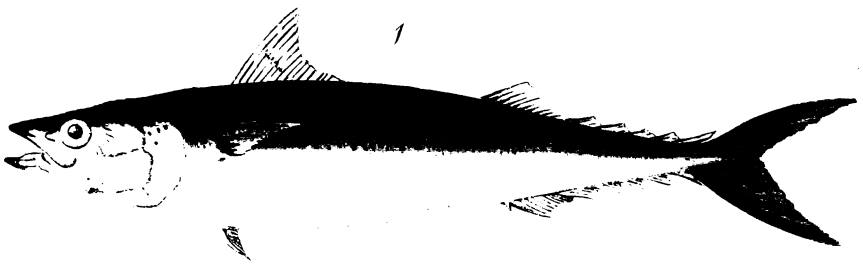

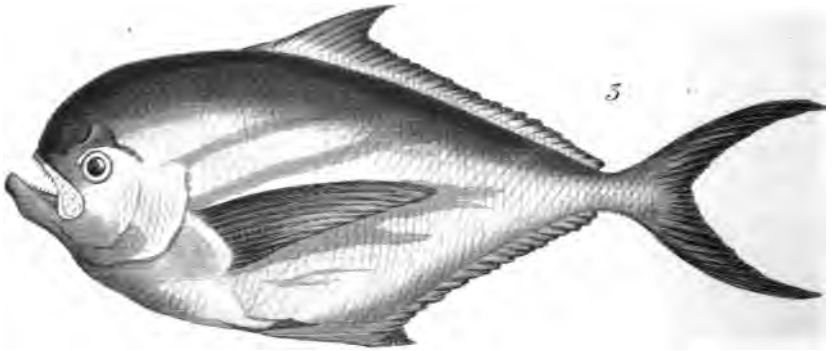

by T.Q.Couch

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On a supposed unrecognized Fish of the genus Brama.

[Plate III., figs. 2, 3.]

By JONATHAN COUCH, Esq., F.L.S., &c.

MEMBER OF THE SOCIETY.

IN a Paper on the Fishes of Cornwall, which I communicated to the Linnean Society in the year 1822 (vol. 14), there is a description of a species which I then referred to the genus *Chaetodon* of Linnæus; a class of fishes that included an immense multitude of species which obtained their generic denomination from the structure and arrangement of their teeth,—resembling rows of slender bristles; but a much more conspicuous character of the class is, that their fins are more or less encrusted with a continuation of the scales which are firmly spread over the body.

The arrangement which Baron Cuvier has made, by elevating the Linnean *Chaetodons* into a family, and denominating them, from this remarkable character of the fins, *Squamipennes* or scale-finned, must be admitted to be a great improvement. He is thus enabled to distribute them into several subordinate genera, in which the genus *Brama* stands conspicuous, by having the whole of the dorsal and anal fins thus guarded, as well as the mystache; and also, by the distinction of an elevated profile and remarkably short snout, the angle of the mouth descending much below the ordinary level. In this genus Cuvier has followed Bloch in placing Ray's bream *(Brama Raii)*, so named from the illustrious British naturalist who first made it known; and indeed the genus itself was especially constituted for the reception of this fish; for it is the opinion of Cuvier and Valenciennes, in which they are followed by Mr. Yarrell, that the genus in fact consists of no more than

this one species, and that the *Chaetodon* above referred to does not differ from the last named fish.

The difficulty of forming a correct opinion on this subject arises in part from the great variety observed in specimens of the same species; but more particularly from the fact that when my Paper on the Cornish Fishes was published, I could not persuade myself that the species there described could be unknown to naturalists of more extended observation. I was not without the hope that at some future time I might be able to identify it by the aid of the sketch which I had then taken, and which I had retained for my own use. When afterwards, my friend Mr. Yarrell was engaged in publishing his "History of British Fishes," this figure was not in my possession and the authority of Cuvier was sufficient to confirm the belief that whatever differences might appear in the descriptions of the two fishes, could be best explained by supposing some inaccuracy or oversight in the examination, or perhaps some accidental difference between the specimens themselves.

The recent recovery of the original drawing of the fish described in the Linnean Transactions,* and a comparison of the account of this specimen in my original memorandum, with the figure and description of an undoubted specimen of Ray's bream, which has also passed under my inspection, will now furnish sufficient grounds for the formation of a correct opinion, whether they are not sufficiently different to be regarded as specifically distinct.

The specimen was about 17 inches long, and, exclusive of the dorsal fin, 5½ inches deep; the snout blunt, sloping suddenly above the eyes; angle of the mouth depressed: teeth numerous, sharp, incurved; the four in front of the under jaw very long: the body deep, thin: two dorsal fins, the first having flexible rays, the second long and narrow, and there is no reason to suppose that the appearance of there being two is owing to a rent or injury between them: the tail very deeply lunated: the pectorals, long; ventral fins double, or having a wing, by which means it seems to have four; the anal, fleshy and somewhat expanded at the origin, obscure in its progress towards the tail: no lateral line: a broad band from eye to eye. The colour blue, deeper on the back than on the

* Vol. xiv., p. 78.

belly: covered with large scales, as well on the body as on the fins, so that the dorsal and anal fins seem like an extension of the body; and it becomes impossible to count the rays of the dorsal fins. It may contribute to the history of this species to add, that it was taken by a servant girl, who saw it at the edge of the water in the act of dying (as if it had wandered into a climate not congenial to its nature), and seized it with her hands. It was sent to me a few hours after its capture, when the colours no doubt had grown more dull than during life.

Ray's Bream *(Brama Raii)*, Yarrell's Br. Fishes, vol. i., p. 117, 1st edit.—The specimen was 23 inches in length, 8½ in depth before the dorsal fin; the figure much compressed. Head small, sloping in front; snout short; angle of the mouth depressed; under jaw longest: teeth slender, numerous, sharp, incurved, the inner row of the lower jaw longest: tongue fleshy. Eye large, not far from the angle of the mouth; iris dark; pupil light. Nostrils single. Measuring along the curve, the dorsal fin begins 7½ inches from the snout, having three shorter rays, like blunt spines, each longer than the other; the fourth ray longest: the fin then becomes narrower, and continues slender to within an inch of the tail. Anal fin shaped like the dorsal: pectoral, 6 inches long, rather narrow, pointing obliquely upward: ventrals triangular, having a wing three-fourths of their length: tail deeply forked. Lateral line nearer the back, obscure. The head, body, and fins, except the pectorals and ventrals, and even the mystache, covered with firmly fixed scales, which are deficient in a band across the forehead; the colour of which, and also of the back, is a very dark blue; copper-coloured brown over and before the eye; somewhat silvery on the sides and below. The dorsal and anal fins, and a stripe along the root of the former, are a sparkling silvery white, tinted with green before the dorsal fin, coppery and lake along the upper part of the sides. Some dusky irregular stripes on the sides. Fin rays:—D. 34; A. 30; P. 18; V. 5; C. 24.

Besides other distinguishing marks of difference between this fish and the former, as will be seen in their respective figures, the arrangement of the scales on the fins will particularly distinguish them; for while in the fish first described, they were as uniformly

distributed on the fins as on the body, so that the rays could not be distinguished, in the latter, they were so arranged in lines, that each row possessed its own, and thus each admitted of a slight degree of motion, the points of the fins also being free. This fish was taken with a line, and was brought to me soon after its capture; but the silvery line along the root of the dorsal fin does not appear to vanish very readily, for it continued when the finer tints were no longer to be seen.

I learn from a note in Cuvier's "Animal Kingdom," that Rafinesque, a Sicilian naturalist, highly commended by Mr. Swainson, has described two species of the genus *Brama*, but I have no opportunity of comparing my observations with what he has said concerning them. Cuvier concludes, from some mistakes that this gentleman had fallen into in describing other subjects of natural history, that no dependance should be placed on his remarks on this also.

On the Cromlêhs near Penzance.

By RICHARD EDMONDS, Jun., Esq.

AMONGST the cromlêhs still existing near Penzance there is one so large, and at the same time so elevated, that in these respects it is probably unequalled by any in the kingdom. Such structures are regarded by some as Druidical altars—by others, as mere tombs: and the common altar-tomb, seen in almost every churchyard, appears to be nothing more than the ancient cromlêh modernized—the cap-stone and supporters being now all finely chiseled and squared and adjusted with mathematical precision, to suit the taste of the present age.

Crom-lêh, or *crobm-lêh* (as it was also spelt), signifies a *crooked* flat-stone. Had the word been written *crobn-lêh* (which in pronunciation differs little or nothing from *crobm-lêh*), it would have signified a *round* flat-stone, and have been synonymous with *quoit*, the name by which these erections are here, and in some parts of Wales,* most commonly known. In France, the celebrated monument of this description, near Poitiers, is termed simply *pierre levée* (the raised stone). Thus, in each country, the entire monument derives its name from the form, or position, of the incumbent slab.

Borlase notices a small cromlêh found near the Land's-end in 1716, containing "an urn full of black earth, and round the urn very large human bones, not placed in their natural order, but irregularly mixed." In describing it he says,—"A farmer of the village of Mên having removed a flat stone seven feet long and six

* Nicholson's Cambrian Guide, 3rd edit., pp. 90, 356.

wide, discovered a cavity underneath, at each end of which was a stone two feet long, and on each side a stone four feet long." * I have called this a cromlêh, although Borlase did not regard it as such—owing, perhaps, to its not being exposed above ground, as our other cromlêhs now are. It appears, however, highly probable that all our cromlêhs were once covered with barrows or tumuli: and Fosbroke describes some demolished ones elsewhere, as "being covered with heaps of stones." † The distinction between a cromlêh and the large kistvaen found in barrows, is that the former is covered with a single slab which in general overhangs its supporters very considerably.

West Lanyon Cromlêh.

Within a tumulus 3½ miles (by the map) N.W. by W. of Penzance, and in the parish of Madron, a cromlêh was discovered in 1790, of which the following account, by the late Rev. Malachi Hitchins, was published in the Archæologia ‡:—

"The gentleman who owns the estate of Lanyon, happening to be overtaken by a shower, took shelter behind a bank of earth and stones; and remarking that the earth was rich, he sent his servants to carry it off, when having removed near one hundred cart-loads, they observed the supporters of a cromlêh, from which the covering stone was slipped off on the south side, but still leaning against them." This covering-stone is about 13½ feet long by 10½ broad. The south supporter, on which it still leans, is 6 feet high and 5 wide: that on the west is nearly of the same height and about 9 feet wide. The east supporter (since cleft and carried away) was 10½ feet wide, and, with the other two, formed almost a triangular kistvaen with a space of about a foot, at the north end, uninclosed.

"As soon as the gentleman observed it to be a cromlêh, he ordered his men to dig under it, where they soon found a broken urn with ashes; and going deeper they found half a scull, the thigh bones, and most of the other bones of a human body, lying in such a manner as fully proved that the grave had been opened before, and

* Antiquities, p. 222. † Encyclopædia of Antiquities. p. 509.

‡ Vol. xiv.: quoted in Cotton's Celtic Remains, p. 37.

the flat stones which formed the grave had been all removed out of their places." The cap-stone and the two remaining supporters are in the middle of a hilly field, two or three furlongs W. of the much more frequented quoit next to be noticed.*

Lanyon Cromlêh.

Lanyon quoit, which is in the same parish, and on the same estate, as the West Lanyon quoit, stands conspicuously about 50 yards E. of the road from Madron church to Morvah, and about a quarter of a mile S.E. of the village of Lanyon. The cap-stone has no side supporters, as our other quoits, but rests on three upright unshapen pillars, two supporting one end, and the opposite end resting on the third. These, and three similar pillars now lying prostrate within the distance of a few feet, might, with others observed by Borlase, have originally formed the kistvaen. The cromlêh (says that Author) "stands on a low bank of earth not two feet higher than the adjacent soil." The horizontal slab is 18½ feet long, 9 wide, and nearly 45 in circumference,† with an average thickness of about 1½ foot — its elevation being about 5 feet. In 1815, it was dismounted during a severe thunder-storm, as had been the case with Mulfra quoit sixty-three years before. In 1824, it was replaced, under the direction of the late Capt. Giddy, R.N., by the machinery employed in replacing the Logan Rock. For these restorations we are indebted principally to the

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* In 1805, another monument of this kind was discovered by Mr. Fenton in Flintshire, also buried within a tumulus, and near a small field containing many kistvaens: the incumbent slab was nearly 9 feet long, covering a kistvaen 4½ feet long, 2½ broad, and 2 deep, which inclosed a fine dry mould interspersed "with some very minute particles of a substance like bone." A small stone hatchet was also found. (Nicholson's Cambrian Guide, p. 265.)

† This circumference exceeds by 5 feet that of *Llech-y-Tribedd*, "the most perfect cromlêh in" Pembrokeshire: and it exceeds in a still greater degree that of *Plâs Newydd*, "the completest cromlêh in Anglesea"—the former being supported by three short upright stones; the latter having stood on seven such supporters. (Nicholson's Cambrian Guide, pp. 207, 155). These Welsh monuments resemble Lanyon cromlêh in the incumbent stones being supported by rude pillars instead of broad slabs.

late Davies Gilbert, Esq., M.P., who not only used his influence with the lords of the admiralty for the loan of the machinery from the Devonport Dock-yard, but contributed from his own purse £30 towards the expenses.

Ch'un Cromlêh.

The most perfect of all our cromlêhs is that of Ch'un, about 5 miles W.N.W. of Penzance, and 500 yards W. of Ch'un Castle —the castle being partly in Madron and partly in Morvah—the cromlêh partly in St. Just and partly in Morvah. The top stone is 12¾ feet long, 11½ wide, and 36 in circumference. The two side supporters are each about 8 feet in length, and, with the two end stones, form "a pretty regular kistvaen," which in Borlase's time had a "low barrow or heap of stones round it," much of which still remains, so that the supporters, although between 5 and 6 feet high, rise only 4 feet above the barrow.

It is remarkable that while Lanyon quoit, West Lanyon quoit, Ch'un castle, and Ch'un quoit are all in the same straight line, E. and W., the kistvaen of each of the three cromlêhs lies within a point or two of N. and S.: and whilst Mulfra quoit and Zennor quoit lie N.N.E. and S.S.W. of one another, their kistvaens point nearly at right angles to that direction; as does also the kistvaen of the small cromlêh of Bosphrennis, 10 furlongs N.W. by W. of Mulfra quoit.

Mulfra Cromlêh.

This cromlêh, on the top of Mulfra hill, in the parish of Madron,* is about 2 miles N.E. of Lanyon quoit, 3½ miles N.N.W. of Penzance, and a quarter of a mile W. of the road from Penzance to Zennor. The cover-stone, according to Borlase, was 9⅔ feet by 14½, including a piece evidently broken off and lying near it. It now scarcely exceeds 36 feet in circumference. The kistvaen is 6⅔ feet long and 4 wide. The three slabs, forming the two ends and one of the sides, are about 5 feet high. The

* Although Mulfra hill is part of Madron, it is detached from the rest of that parish by an intervening portion of Gulval.

south side supporter is gone, and on that side the cover-stone has fallen so as to rest on the ground at an angle of about 45°, leaning against the east and west supporters. In this state it was described by Borlase in 1754; the displacement must therefore have occurred prior to that time, and I am informed that it took place during the terrific thunder-storm there in 1752. It is true that Borlase, in his description of that storm, makes no allusion to the quoit, although the fragment which he saw might have led him to suppose that its fall had been recent: but the locality was so little frequented, that when he visited it he might have been unable to ascertain the time of its displacement. At that period, a barrow surrounded it, about 2 feet high and 37 in diameter, of which at present little or nothing remains.

Bosphrennis Cromlêh.

This is a small dismounted quoit, in the parish of Zennor, nearly a quarter of a mile from Bosphrennis and 100 feet S.W. of the foot-path leading from that village to the village of Bosigran. The croft in which it lies is called after it, the *Quoit croft*. The kistvaen is about 4 feet high, 3 wide, and 5 long. The cap-stone is nearly circular, 5 feet in diameter and about 6 inches thick. The slab which forms its south-western side is 6 feet long,—the supporter on the opposite side is gone, and on that side the cover-stone lies prostrate on the ground. The N.W. end consists of a single stone—the S.E. end of two. Around it is a heap of earth and stones, the remains apparently of a barrow which once covered it.

Between this quoit and that next to be described was another of considerable size in the estate of Trewey, 200 yards S.E. of Gundry-cave. It was completely destroyed a few years ago by some labourers, without the knowledge and to the great regret of the proprietor. Neither the cave nor the cromlêh has been noticed by Borlase. The former seems to have been a large and very remarkable barrow, having its centre depressed into the form of a bowl.—At the bottom of this hollow, until a few years ago, was a horizontal slab 6 or 8 feet square supported by others set upright. It is worthy of remark that a barrow of the

same description occurs in Wales, near Plâs Newydd, and at the same distance from the celebrated cromlêh there,* as Gundry-cave was from Trewey cromlêh. Gundry-cave is on an eminence about half a mile S. of Zennor church, and close on the E. side of the road to Penzance.

The great Cromlêh of Zennor.

The great cromlêh referred to at the commencement of this Paper lies in a croft on a very elevated plain, half a mile (by the map) to the east of Zennor church; the granite slabs which form it having been apparently taken from the intervening cairn. Although its distance from Penzance is scarcely more than 5 miles (N. by W.), its situation is so barren and unfrequented that few persons here seem to be aware of the existence of the monument. Mr. Cotton in his "Celtic Remains," written in 1826, actually states (p. 36) that it was "totally destroyed." I saw it for the first time only five weeks ago, since which an excellent drawing of it has been made for the society by Mr. Willis of Penzance.† This "very large handsome cromlêh," as Borlase terms it, appears, like the West Lanyon and each of our other cromlêhs, to have been once covered with a barrow or tumulus, the remains of which, when that Author visited it, reached nearly as high as the cap-stone, and were 14 yards in diameter. The kist-vaen is about 6½ feet long, 4½ wide, and from 8 to 9 feet high; the supporters on the north and south sides, and at the east end, being 9 feet, that at the west end only 8 feet, high. The single slab which forms the south supporter is 11½ feet long. This and the two slabs on the north side run on beyond that of the east end until they come almost into contact with two other large slabs (each nearly 11 feet long) placed at right angles with them, thus

* Nicholson's Cambrian Guide, p. 155.

† Mr. Willis's much admired engravings of Mulfra, Lanyon, and Ch'un cromlêhs, to which that of Zennor is now added, may be purchased at 3*d* each.

Exact models of the five cromlêhs described in this Paper have been beautifully executed in clay, by the Misses Louisa and Matilda Millett, and presented by these ladies to the society.

forming a second kistvaen, 5 feet long from north to south, 2 from east to west, and 9 feet high, covered with the same cap-stone. Into this second kistvaen there is an entrance 2 feet wide, between its two eastern slabs. The cover-stone measures 18 feet in length, 11 in breadth, and 48 in circumference—its average thickness being about 1 foot, and its weight between 10 and 12 tons.

A cromlêh covering so large an area, and at the same time so elevated, is not perhaps to be found elsewhere in Europe. It surpasses *Pentre Evan*, in Pembrokeshire, which Sir Rd. Hoare thought superior in size and height to all the other cromlêhs in Wales.* It is also one foot higher, and considerably larger, than the "stupendous monument" in Kent, between Rochester and Maidstone, called "*Kit's-Cotty-House*," or (vulgarly and therefore perhaps more anciently) "*Kit's Cote*," a corruption, possibly, of *Quoits' Quoit*—the quoit of quoits.†

I have described the great Zennor quoit as it was fifty years ago, and as it will be again, in all probability, before the society's next anniversary. At present the cap-stone rests with its west end on the ground, the supporter at that end having been broken into two parts, the upper fragment being still within the kistvaen. Neither

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* The top stone of *Pentre Evan* cromlêh is 18 feet long and 9 broad, resting on two supporters of columnar form, the one above 8, the other above 7, feet high, with an intermediate one that does not quite reach the south end. "It is encircled by rude stones 150 feet in circumference." (Nicholson's Cambrian Guide, pp. 477, 479.)

Another Welsh cromlêh near Haverford-west, now fallen, was larger than that of *Pentre Evan*, the cap-stone being 16½ by 13½ feet, and from 4 to above 5 feet thick. It also was "in the centre of a circle of upright stones." (Ib., p. 285.)

The largest cromlêh in Wales is that between Cowbridge and Cardiff, its horizontal slab being 24 feet long, 17 in its greatest breadth, and from 2 to 2½ thick. The north supporter is 16 feet long, the west 9 feet: at the east extremity are three stones set closely together: the south side is open. The height at the east end is 6 feet; at the west, 4½. (Ib., p. 225.)

Coeten Arthur (Arthur's quoit), in Anglesea, rests on several supporters, measures 17½ feet by 15 feet, and is nearly 4 feet thick, but is raised only 2 feet above the ground. (Ib., p. 356.)

In France, near Poitiers, the *Pierre Levée*, which has five supporters, is 50 feet in circumference. (Rees' Cyclopædia.)

† Some derive "*Kit's Cote*" from the name of a shepherd who is said to have lived in it—others, from that of a British deity. (Gent. Mag., 1763, p. 248, & 1824, pp. 125, 400.)

fragment bears any mark of a tool. Traces, however, of the borer are very evident in one of the two huge eastern slabs, which was cleft horizontally, not many years ago, and more than half of its height removed. Happily, before any further injury was committed, the late Mr. Osborne of Trendrine, the proprietor, received intelligence of the intended demolition of the cromlêh, and to him Cornwall is indebted for the preservation of this noble monument.

Penzance, 7th Oct., 1848.

List of Insects (Lepidoptera) *found in the district of the Land's-end.*

By Mr. WILLIAM NOYE,

ASSOCIATE OF THE SOCIETY.

HAVING on two preceding seasons given lists of *Lepidoptera* found in this district, I again yield to the solicitations of the members of the society, by giving a list of my captures and discoveries during the past twelve months, which, considering my want of leisure and the few facilities I have for collecting, have not been few. The summer has been unusually wet and stormy, which is not only very detrimental to collecting, but has been the means of destroying a great many others in the larva and pupa state. Illustrative of this I give one instance.—This summer I captured upwards of sixty larvæ of the rare *Lasiocampa trifolii:* I expected from these, and what I thought I might capture in the imago state, to have been enabled to supply almost all the cabinets in the kingdom; but of these I only bred three, and two of them were imperfect. Many of the larvæ commenced constructing their cocoons and died ere they had accomplished their work; others finished their cocoons but died without changing to the pupa state. I examined several cocoons last week given me by a lady of Penzance who found the larvæ at Treen castle in June last; on opening them I found the moths all perfect and ready to emerge from the pupa, but quite dead. To the same cause I think we may attribute the exceeding scarcity of nearly all the autumnal *Noctuidæ:* many species which I calculated upon with a certainty to have captured, I have not seen for the season.

Every succeeding season shews that our district is not poor in insects—*Lepidoptera* at least; and during the last year we have discovered several species new to the district, and some of them

exceedingly rare in Britain. Of the orders of insects not included in this list our district produces many rarities, but for want of collectors we fail to possess them: I hope the day is not very distant when persons of wealth and respectability will devote some of their spare time to this beautiful but much neglected branch of natural history.

Of PAPILIONES:—

Hipparchia hyperanthus. One specimen about the end of June.

——— *davus* ..... I saw a very beautiful specimen of this species one day about the end of May last, at Trengwainton ponds, but it flew over the water and escaped my net.

Polyommatus argiolus .. A pair at Trengwainton about the end of April hovering near some holly bushes, on which the larvæ feeds.

BOMBYCINA:—

Notodonto ziczac..... One specimen, captured in a house near Penzance, in March.

Arctia villica..... Four specimens of this beautiful insect were captured in this district in June, two of which were presented to me; but they were much injured.

NOCTUINA:—

Lithosia quadra..... Taken in July, at Rose Vale.

Rusina ferruginea ..... One taken in July, 1847, at Rose Vale, by Mr. George Fox.

Graphiphora cataleuca.. I have one specimen of this, taken some years since at St. Just.*

* This species was considered peculiar to North Britain; but its occurrence in Cornwall may not be wondered at, when last season I sent a great many specimens of the common *Lasiocampa quercus* to Mr. Stainton of Kent, who informed me that they were all the Scotch variety of that species, which is the only variety I have found in this district.

Semiphora Gothica .... I captured this species in March, off sallows, at Rose Vale: it is an abundant species where sallows occur.

Caradrina blanda ..... I captured one specimen of this in July at St. Just.

Hadena plebeia..... I have not unfrequently found this species at St. Just; it occurs in June and July.

——— *Protea* ..... This has occured, but rarely, at St. Just; it appears in spring and autumn.

——— *gemina*..... This has been taken in June, but it is a rare species.

Mamestra albicolon .... This occurs in August, but is very rare; I have found but one specimen in this district.

Hama basilinea..... I found this species in July last, at St. Just.

Miana strigilis ..... In August last I captured this species in some plenty, at St. Just.

——— *humeralis* ..... In company with the preceding; and also at Rose Vale.

Polia lichenea..... I had two specimens of this rare species for nearly five years and did not know what it was, there being no figure or description of the insect published in any work on British *Lepidoptera*; but last season having captured both sexes, I sent a pair to Mr. H. Doubleday for inspection, who very kindly named it for me: it occurs in October. I have not yet seen it for the season, though I have been on the look out for it.

Gortyna flavago ..... I have known but one of this species taken here, though I have seen the larvæ not unfrequently, but could never breed it; it feeds on the pith of the common burdock.

Of the GEOMETRIDÆ (Step.):—

Fidonia atomaria..... This pretty little insect occurs plentifully in June on heaths; it presents many varieties.

Anisopteryx æscularia .. Appears in March and April, about hedges.

Hybernia capreolaria... Found in the same months as the preceding species, and in similar situations.

Biston betularius..... This fine insect occurs in June; it is not very abundant.

Crocallis elinguaria .... This species occurs sparingly, in June and July.

Odontopera bidentata.... Several specimens of this species were captured at St. Just, in June, 1847.

Geometra angularia .... I have never captured but one of this species, which was in August, 1846, at Newlyn; it is said to be common in many parts of the kingdom.

——— *illunaria* ..... Occurs in some plenty, in March and the beginning of April, in shady lanes and about hedges. *G. Julinaria* of some authors is a variety of this species; it occurs in July.

Rumia cratægata..... This common, but not inelegant, species, occurs in abundance, from April to October.

Ourapteryx sambucaria . Appears in July; not rare.

Hemithea papilionarius . Some years since one specimen of this fine insect was captured in this district; but I have not been fortunate enough to meet with it.

——— *cythisaria*.... I have taken this species on heaths, in July, not unfrequently.

Alcis repandaria..... Occurs in July in plenty.

—— *rhomboidaria* . ... Found in July, in woody places; not rare.

Cabera pusaria..... Appears from May till August; very common.

Phasiane plumbaria .... Found on heaths, in June and July; common.

Larentia chenopodiata .. Very common in June and July.

Cidaria didymata..... In July; common.

——— *unidentaria*.... From May to August; very abnndant.

——— *ferrugaria*..... In the same months as the preceding.

——— *miaria*..... Found in June and July, in woody places; common.

——— *olivaria*..... In August and September; not scarce.

——— *montanata*..... Found in June & July; very abundant.

——— *fluctuata*..... Appears in gardens, from April till October, in great plenty.

——— *propugnata*.... Occurs in July. This is rather a rare species, though considered a common one in many parts of the kingdom.

Harpalyce ocellata..... Found in June and July; not scarce.

——— *subtristata*... From June till August; very abundant.

——— *unangulata* .. Appears in June; rather scarce.

——— *silaceata* .... I have only found one specimen of this species in this district; it appears in June and also in August in other localities.

Polyphasia immanata... Appears in June and July; not scarce.

——— *marmorata*.. In July and August; rather scarce.

——— *centum-notata* Occurs from May till October; very common. These three last-named species are by some authors reduced to one, while others have multiplied them to eight: I believe there are one or two very variable species.

Steganolophia prunata .. Occurs in gardens in July; not rare.

Lampropteryx suffumata. Found in April, about hedges and in lanes; very common.

Electra pyraliata ..... Some years since I beat two specimens out of a hazel bush, about the end of June; I have not since met with it.

Anaitis plagiata..... Found from May till Sept.; not scarce.

Abraxas grossulariata .. Appears in July, about hedges and gardens, in profusion.

Zerene rubiginata ..... This delicate little species occurs some seasons in plenty, in gardens and woody places; it appears in June and July.

Euthalia elutata ..... Appears in July and August; very common about hedges.

Camptogramma biliniata. In June, July, and August; very abundant everywhere.

Charissa obscuraria..... Occurs in July; common.

Cheimatobia brumata.... Occurs in November and December; very common in orchards.

———— *rupicapraria*. Appears in January and February, in similar situations as the preceding. The females of these two species are apterous.

Eupithecia rectangulata . Occurs in May & June; very common.

———— *coronata* .... I have occasionally found this rare species at Rose Vale and Newlyn; it appears in July.

———— *nanata* ..... I have one or two specimens of this species; it appears to be very rare: found in July.

———— *strobilata* ... Found in June; not very scarce.

———— *exiguata* .... In June; rather common.

———— *absinthiata* .. A very common species; found in gardens in June and July.

———— *angustata* ... Appears in July & August; not scarce.*

Emmelesia decolorata ... Appears in June and July; very common at St. Just.

———— *rivulata* ..... Not uncommon in June and July.

———— *hydraria* .... This I have found occasionally with the preceding species; some authors consider it a small variety of that, but Mr. Henry Doubleday has separated them as distinct species in his Catalogue of British Lepidoptera.

Venilia macularia ..... Occurs sparingly, in woody places, in June.

* I have found several other species of *Eupithesia*, but many of them are difficult to make out, therefore I have not recorded them.

Ptychopoda dilutaria ... Appears in August, about hedges and in gardens; plentiful.

——— *bisetata* .... Found in July and August; rare.

——— *incanata* ... Occurs in July; not scarce.

——— *scutularia* .. I captured one or two specimens of this species in the summer of 1846, but have not seen it since that season.

Acidalia virgularia ..... In July; not rare; on hedges.

——— *subsericeata* .... In June; very rare: not seen since 1846.

——— *aversata*..... In the summer months; common.

Pœcilophasia marginata . I have found this species in July at Trengwainton ponds, but not common.

Chlorissa thymiaria .... Occurs in June, about hedges; not rare.

PLATYPTERICIDÆ (Step.):—

Cilix compressa ..... Appears in May and August, but not common.

PYRALIDÆ (Lea.):—

Hypena proboscidalis ... Found about hedges in July and Aug.; common.

Aglossa pinguinalis ..... Appears in July and August; not common: it has been captured at Rose Vale.

Simaethis Fabriciana ... Occurs in June and July, about hedges, in abundance.

Pyrausta cespitalis ..... This species occurs in profusion, at the Land's-end, in May and July.

Hydrocampe potamogata. In June and August; very abundant.

Phlyctœnia sambucata .. Found in gardens in July; not common.

Botys urticata..... Appears in June; not scarce.

——— *forficalis* ..... In May, July, and August; abundant.

Margaritia ochrealis.... I have found this species, by a small stream of water at Sennen sands, very plentiful in July, but have failed to discover it in any other part of the district.

——— *ferrugalis*... In July, Aug., and Oct., amongst rank herbage and strawberry beds; not rare.

Margaritia sericealis ... In June, at Trengwainton valley; plentiful.
———— *prunalis* .... In June; common about hedges.
———— *olivalis* ..... Found in July; not common.

I have thus given an imperfect list of the *Lepidoptera* of our district. I say imperfect, because I believe that we have not yet discovered any thing like all the species which the district produces. I have not given the *Micro-Lepidoptera*, because I have not properly studied that order; but the few that I have by chance found contains some very rare species — as *Tortrix Galeana* and many others. I may at some future period try to make out a list for the society.

Oct. 7th, 1848.

Notice of Birds near Liskeard, by N. HARE, Jun., Esq., in a Letter to E. H. RODD, one of the Secretaries.

Liskeard, 6th Oct., 1848.

Sir,

During the last few years I have been making a collection of the eggs of birds breeding in this neighbourhood, and this season I have been fortunate enough to procure those of the Dunlin *(Tringa variabilis)*. The nest was found by a farmer's boy, about the last week in May, on Goodiver moor, near Dozmare pool. It contained three eggs, two of which were given me, the third having been broken: incubation had just commenced. The description of the egg, as given in Mr. Yarrell's work on British Birds, I found to be exceedingly accurate, and would have enabled me to identify it had I not been furnished with particulars of the bird, which was seen by the boy near the nest, and by him called a "stark." The boy told me the egg was a scarce one, the "stark" only breeding with them occasionally, and that a pair or two is the most he has seen in any one year. Some of my ornithological friends who have had greater experience than myself inform me that they believe this to be the first nest and eggs known to have been taken in the county, and that the fact of the Dunlin breeding in Cornwall is at present unrecorded, and indeed before this instance unknown. It has been suspected that some of these birds which leave our coast in May might retire to our moors for the purpose of incubation. If this should prove to be the case, and that it is new to the oology of our county, I shall be glad to have been the means of communicating it to you.

A specimen of the black tern *(Sterna nigra)*, a young bird of the year, was shot on a moor near Dozmare pool on the 7th ult., and two years since a spotted rail, now in my possession, was killed on one of the moors in the same neighbourhood.

Whilst crossing from one moor stream to another, in my fishing excursions, I have often disturbed from among the rushes the harrier, curlew, lapwing, snipe, and sandpiper; all these birds, as

also the wild duck, breed on those moors every year, and I have heard of a gull's nest being found. I have no doubt if the extensive moors around Dozmare were thoroughly examined in the summer months the nests of many birds at present not known to breed with us would be found there.

I may also mention that (in addition to an instance that came under my own notice some few years since) a nest of the ring ouzel containing four eggs was found last year near Cheesewring, and this year three more nests, with the same number of eggs in each, have been found in the same locality.

A merlin was shot in a field near this town in January last; a specimen of the bittern, which now rarely visits us, was also killed about the same time, and a very fine specimen of the short-eared owl.

An osprey was captured this morning at Moorswater Lodge, the seat of J. Lyne, Esq., distant about a mile from this place. The bird had been seen on several previous days about the grounds, and was once fired at: the trout in the fish ponds no doubt allured it there. It was caught by means of a pole twelve or fourteen feet long driven into the ground by the side of the upper pool, on the top of which a gin was placed. The apparatus had been scarcely completed ten minutes before the bird was caught: it was very little injured. I saw it a few hours afterwards perched on the railing in front of the house: it had a noble appearance and looked resigned, though sad. The eyes struck me as being very beautiful. On attempting to touch it with a stick it reached forward its head and neck and erected the occipital feathers, but made no attempt to seize the stick. The bird appeared very quiet, and suffered itself to be handled without making any resistance. The dark brown feathers of the back were tipped with dirty white which I understand denotes a young bird.

I have the honor to be,

Sir,

Your obedient Servant,

N. Hare, Jr.

E. H. Rodd, Esq.

On the disease in the Potato.

By J. RALFS, Esq., M.R.C.S., &c.,

HONORARY MEMBER OF THE SOCIETY.

MY attention has frequently been arrested by the numerous causes assigned as productive of the disease that has been so destructive to the potato crop. In a notice of a Paper "on the complexity in the condition of Animals," communicated to this society by J. Couch, Esq., I have seen it remarked that "it has been pretty clearly proved that it is owing to the destructive powers of an *Aphis* that we may attribute the late distressing failure in the potato crop."

As the above assertion is certainly incorrect, and as a conviction of its truth may operate injuriously in restricting the cultivation of this valuable esculent, I beg to offer a few remarks on the subject. So far from its being proved that an insect is the cause of the disease, I believe that not a single naturalist of any eminence, either botanist or entomologist, has concurred in Mr. Smee's views; and I shall endeavour, briefly, to show that such an opinion is erroneous. In these remarks I lay claim to no views that have not been repeatedly advanced by others, and can only say they are corroborated by my own observations.

The potato failure has been attributed by different persons to three causes.

First, to the injury caused by an *Aphis*. This opinion, although the last advanced and the least probable, has attained much notoriety from the indefatigable activity of its Author, Mr. Smee. Injuries produced by the attacks of insects are always comparatively local; generally only a single district suffers, and even the

ravages of the locust, the most destructive of all insect pests, are confined within certain limits, whilst the potato disease is destructive in America as well as in Europe, and I need not say that it is utterly impossible for swarms of *Aphides* to cross from one continent to another. If the failure was caused by the *Aphis*, it would always prevail more or less; for, as an eminent entomologist, Mr. Westwood, has shown, the potato *Aphis* is not a new creation, but has always been a common insect in this country; yet, although we have before had partial failures of the potato crop, this disease was unknown until the present visitation. At Dolgelley, in North Wales, I observed during the last autumn several fields in which the potatoes had the worst form of the disease; but after careful search, I was unable to detect a single *Aphis;* indeed, I never remember to have seen even healthy fields so free from them. Mr. Moggridge, a gentleman of Swansea who has paid much attention to the subject, informed me that he had seen potato crops, which were infested by the insect, free from the complaint, whilst in other instances the plants untouched by *Aphides* were totally destroyed. And Mr. Noye, a diligent member of this society, found the *Aphis* very abundant last summer, nevertheless his potatoes are in very good condition. That the *Aphis* is generally present on affected plants, must be admitted; the insect, however, is not the cause but the effect, for, as Mr. Westwood has truly stated, the *Aphis* does not attack healthy plants, but only those in a debilitated state. It is well known to those who cultivate plants in pots, that, if from deficient light, or any other cause, the plant becomes unhealthy, the insect appears, and on the restoration of health, speedily disappears. An instance of this kind occurred last spring. The potato plants in various parts of the kingdom were injured by an east wind, and, in a single night, had the semblance of being diseased, and the newspapers contained numerous notices of the reappearance of the pest; in this case, as usual, the weakened plants swarmed with *Aphides*. Last June, I was present at a scientific meeting in London, when Mr. Smee, in illustration of his views, exhibited the potato and other plants covered with these insects; but, it is now well known, that the distemper did not really commence until long afterwards. In fact,

the plants recovered from the effects of the wind, and the plant-louse *(Aphis)* disappeared.

The second cause to which the failure of the potato has been attributed, is the presence of a small fungus, *Botrytis infestans.* Although this opinion is much more plausible than the former, and has been advocated by the Rev. M. J. Berkeley, and other botanists of the highest reputation, whose opinions deserve the greatest consideration, because their views are not mere hasty and crude guesses, but the result of careful observation, yet I must doubt its correctness, for nearly the same reason that I deny the agency of the *Aphis.* The disease has too wide a range,—the fungus is a very common one, and some years ago I observed it in greater plenty in this district than I have during the two last years; but, as I have just remarked, the disease is a recent visitation. I do not mean to assert that either the insect or the fungus is innoxious. I believe that neither of them will attack a healthy plant; but as the plant attacked is already in an enfeebled condition, it may easily be conceived that these parasites will add to the injury, and render the destruction more certain and complete. It is the nature of most parasites to thrive best on an individual weakened from any cause. If sheep be debilitated by illness, they will be very liable to be infested with vermin; and it is well known, that persons feeble from old age, or reduced by illness, are more liable to such inflictions than when they are in vigorous health; and in such cases, the parasite is more difficult to eradicate. The *Algæ* afford excellent examples: whilst young and in perfection, they are free from the growth of other *Algæ;* but no sooner do they pass maturity, than they become loaded with parasites. Many cases, too, have been recorded of fish in a sickly state becoming covered with parasitic *Confervæ.*

The third explanation of the potato failure, is an epidemic visitation. This I believe to be the correct one. It is the view taken by Lindley and the greater number of the most distinguished botanists.

It has long been my opinion that, in considering the maladies of vegetables, we too much disregard the light that may be derived from those of animals; we look upon them as having nothing in

common with each other, and yet the better we understand their physiology, the more we admire their many points of agreement. The primary element of both animal and vegetable, is a simple cell. The seed of the plant corresponds with the ovum of the animal. Air, light, heat, and food, are necessary to both. Like animals, plants breathe and have a circulating fluid, and an internal heat, more or less independent of external influences. In the same individual, too, very different products are secreted from the same circulating fluid. They are born, they grow, they die. With all these points in unison, is it not to be expected that their diseases also will have some analogy? I believe that such is the case, merely modified, as in other particulars, according to their different conditions. This view is not without its advocates, as may be seen by the following extract from the *Times* newspaper :—

"BRUSSELS, Oct. 19.—REMEDY FOR THE POTATO DISEASE.—A highly interesting paper appears in the *Agricultural Bulletin*, from which it appears that a chymist named Eusebing Gris has been paying great attention to the disease, and has found a direct and radical remedy. This gentleman, guided by analogy, has compared the disease of this vegetable to the chlorosis which attacks the human frame, and the idea suggested itself to him whether applying the very same remedies which improve the vitality of the blood, which restore its energy and its colour, might not be advantageously resorted to in reanimating the languishing vitality and tone of the discoloured leaves. He accordingly had recourse to application of salts of iron. He watered the plants with a solution of sulphate of iron, containing from 10 to 20 grains of the salt of iron to 1 litre of water, and moistened the leaves with a lighter solution, containing only about 3 grains to a litre of water. This last method proved much more immediately the efficacy of the remedy than that of watering the plants, for in the latter case it might be attributed to a chymical reaction produced in the interior of the soil. A committee was appointed by the Royal Society to test the results of M. Gris's remedy. Experiments were made in various parts, some on an extended, some on a smaller scale. They were very successful in regard to the disease itself, and the committee reported that although some further trials

were needed to prove the facts, yet it was thought probable that this solution might likewise be found valuable on sandy soil. Mr. Gandry, of Paris, was induced to try the remedy on some young chlorotic peach trees, and a fortnight after, when the committee of the Horticultural Society inspected them, they had entirely recovered."

I do not concur with the writer of the above extract, as to the nature of the complaint, believing it to be more analogous to an epidemic. Compare it with an epidemic among animals. It is characteristic of epidemics that they come we know not how; they go we know not why; they appear in widely-separated countries. They are always most virulent at their commencement, become less and less destructive, and at last gradually disappear. They seem comparatively uninfluenced by heat or cold, wet or dry; prevail in low marshes or by the sea-side, and ascend into the mountains. So it has been with the potato murrain, which is as destructive in America as in Europe, on the mountains of Wales as near the sea in Cornwall: it is equally capricious, leaving a district or even a field untouched, whilst committing havoc in adjacent parts, without any apparent cause. Nay, even the alleged causes help the resemblance. The cholera was attributed to the presence of minute insects, &c., by the ignorant; and, indeed, if we examine the records of any similar universal pestilence, we always find it attributed by some persons to such causes. Whether contagious diseases may or may not be communicated by the agency of insects, is an interesting point, the consideration of which is foreign to the present subject.

I believe, however, that the virulence of the disease is past. It appeared later this year, and has been far less destructive; and I firmly believe that we need entertain no dread for next year. I do not say that no traces of it may hereafter occur, but I am fully persuaded that the loss from this cause will be trivial indeed, and probably there have been few periods so encouraging to the cultivator as the present. After an epidemic has ceased, the produce is likely to be more than usually abundant,—the tuber to be of good quality, and as a less quantity will be cultivated, it will certainly command a more than average price, however ample the produce.

I might bring forward many extracts from writers on this topic, in support of the opinions I have here maintained, but I shall content myself with the following one from Forbes's British and Foreign Medical Review:—

"The supposition of Mr. Smee of the influence of an *Aphis* in producing this result, scarcely needs a serious denial; and, on the other hand, though the universal existence of a vegetable parasite (*Botrytis infestans*) be observed, and though it be conceded that it is a true parasite, inasmuch as it subsists on living and not dead vegetable matter, yet for its finding a suitable pabulum, we are told that the plant must be in a feeble condition, and it is this aliquid prius which, in our opinion, is the disease, while, to use the words of Mr. Wood, the fungi are, 'in fact, the result and not the cause.' This disease has its parallel in the epidemics of man and animals. It has no affinity with these, but they are nevertheless its true analogues."

In the Report of the Royal Polytechnic Society for 1845, is a Paper by J. Couch, Esq., on the potato disease, which contains the fullest and most accurate description I have seen of the appearances presented by the infected plant in all its stages. The Author, without expressing a decided opinion on the cause of the disease, evidently inclines to the belief that it exhibits characters resembling those of an epidemic.

Plants produced from seed are affected equally with those grown in the common mode from tubers. This fact, and the occurrence of the disease in the native countries of the potato, disproves the supposition of its depending on deterioration of the plant by cultivation in an uncongenial climate.

Nov., 1847.

P.S. November, 1848.

Another year's observation has confirmed the theory respecting the cause of the potato disease which I have advocated in the preceding Paper. It may appear an overweening confidence in the opinion which I expressed respecting the probability of the disappearance of the disease to maintain that I was fully justified

in that opinion after it has apparently been contradicted by the present failure of the crop: but I still think that under ordinary circumstances my anticipation would have been realized, and that sufficient reason can be shown, from the peculiarity of the seasons and the analogy of other diseases, why my expectations have been disappointed.

The past summer and autumn have been most favourable for the occurrence of epidemics and analogous disorders,—yellow-fever, typhus, dysentery, cholera, and diseases of a kindred type have ravaged the earth. In the vegetable kingdom the potato-disease has again extensively prevailed in both Europe and America: the crop of yams in many of the West Indian Islands has been destroyed by a complaint apparently identical with that which attacks the potato, and a disease of an epidemic character has committed so much havoc among the pines in the southern parts of the United States, as to threaten the destruction of entire forests.

Our prognosis must be founded on experience and general laws, and these justify the anticipation that when an epidemic has disappeared from a district it will not renew its attack during the same visitation; hence a town in which the cholera has ceased after having gathered its victims has usually been considered safe from its return. The past summer has, however, produced numerous exceptions to this rule. Moscow and several other towns in Russia, although they suffered from the cholera in 1847, have been again attacked this year, and the mortality has been far greater on its second occurrence. This striking instance of the deviation of a formidable epidemic affecting man may lead us to conclude, from analogical reasoning, that the potato disease has recurred with equal irregularity: and again, the diffusion of this and other equally destructive vegetable diseases, over countries differing most widely in situation and climate, not only forbid us to attribute the potato disease to either an insect or a fungus, but appear to me as conclusive evidence that it arises from atmospheric causes.

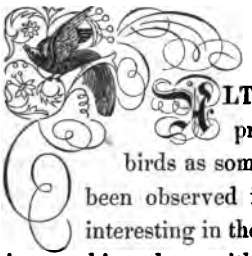
I consider the following fact, although it throws no additional light on the causes, is too remarkable to be omitted whilst I am

writing on this subject. At Dolgelley, my friend Mr. Williams showed me an abundant and healthy crop of potatoes, the produce of planted shoots that had been taken from tubers lying in his cellar. This crop consisted of several varieties intermixed. Adjacent patches, cultivated in the usual manner, were all more or less diseased.

Additions to Cornish Fauna.

By EDWARD HEARLE RODD, Esq.,

ONE OF THE SECRETARIES.



ALTHOUGH the past year has not been so productive of rare and valuable species of birds as some of the previous ones, still examples have been observed in this neighbourhood sufficiently rare and interesting in themselves to encourage zealous perseverance in watching the ornithological resources of a district so highly favored as ours is.

A general notice has been made in the Secretaries' Report of the occurrence of the white stork *(Ciconia alba)*, the Continental white wagtail *(Motacilla alba* of Linnæus), the grey-headed wagtail (*Motacilla flava* of Linnæus, and *neglecta* of Gould), and the spoonbill (*Plutalea leucorodia)* since our last meeting. Of these, the most worthy of notice, perhaps, is the white stork, which I believe may be regarded as new to our Cornish *Fauna:* at all events I have in vain sought for a record of its occurrence in the county. From the abundance of this species on the contiguous coasts of Holland and France, it has been a matter of wonder that in England its visits have been so rare, and very often after the intervals have extended to several years. The circumstance of its northern migration, extending to much higher parallels of latitude than the British Isles, affords a perplexing mystery as to the limits prescribed by Nature in the direction of the migration of birds. The winter retreats of the white stork are the northern regions of Africa, including Egypt; in the early spring months they ascend to France, Germany, Holland, Poland, and Russia,

sometimes to Sweden, and even to Scandinavia. In this extended range of migration, the British Isles appear to be wholly disregarded by the great body; and it may not perhaps be improbable that where the exceptions occur, causes apart from the guidance of Nature may be found to explain them, such as adverse winds and violent weather.

The frequent occurrence, during the past summer, of the Continental wagtail (*Motacilla alba* of Linnæus) in the immediate neighbourhood of Penzance, deserves notice from its reputed scarcity in England. In a Paper by Mr. Gould, published in 1837, he says that "the place of our common white wagtail in the temperate portions of Europe is supplied by a nearly allied but distinct species, the *true Motacilla alba* of Linnæus, which although abundant in France, has never yet been discovered on the opposite shores of Kent, or in any part of England." Another species (the grey-headed wagtail), unknown by record to the British Isles until so late a period as 1834, has presented itself to our district during the past year. Both male and female were observed and secured; and in order to let the meeting see the distinctive characters of both the rare wagtails referred to, from their congeners with whom they have been confounded, examples of the four species are now placed on the table: viz.,—the common pied wagtail, and the Continental pied wagtail,—the yellow wagtail, and the grey-headed wagtail.

The occurrence of the white spoonbill as a remarkable bird, and whose visits are so uncertain, that the capture of every individual is regarded with interest, has been referred to in the Report; but so many notices have appeared respecting this species of late years, appearing sometimes singly, at others in flocks, all over England, that it would be useless to make further comments than a simple record of the fact of its occurrence almost within the town of Penzance.

Oct. 6th, 1848.

On the Mackerel.

By RICHARD Q. COUCH, M.R.C.S.,

ONE OF THE SECRETARIES.

NEXT to the pilchard, the mackerel is perhaps the most important fish to the Cornish fisherman; for more hands are employed, and more capital embarked in its capture, than in that of any other. It is of great importance, therefore, that its habits and migrations should be accurately ascertained, that the outlay necessary for the fishery should be skilfully and economically directed. It is quite unnecessary either to describe so common and well known a fish, or to say one word in its praise as an article of food. The whole of the *Scomberidæ* are remarkable for the beauty of their colouring, elegancy of their forms, and the rapidity of their movements; and our common mackerel may be taken as the perfection of the class. The mackerel are not only active swimmers, but voracious feeders. They remain on our shores throughout the year, but vary their positions every day. I have seen specimens of different sizes every month in the year; they do not therefore, those on the Cornish shores at least, perform those distant migrations so wonderfully and minutely described by some authorities. The sizes of the "*schulls*" vary much, but their migrations have occurred with great regularity for many years past. The fishery is carried on with great regularity so far as regards the seasons, but the remunerative success is very uncertain.

The fishery for the mackerel may be divided into three sections, —the autumnal and winter, the spring, and the summer; and as it is from information derived from the fishermen engaged at these periods, that I am enabled to lay the present communication before the society, I shall speak of the movements of the fish in connexion with the means employed for its capture.

In the autumn the fish congregate in "*schulls*," to the west and south-west of the Scilly Islands, at distances varying from two to seven leagues. At this time the direction of their course varies from E. to N.E. and N., or to the entrances of the Bristol Channel and the Irish Sea; the last of which appears to be their favourite autumnal resort. Towards the latter part of autumn they migrate to the south, and generally pass between the Scilly Islands and the Land's-end into the English Channel. By this course the largest quantities pass; but some go to the westward of the islands into deep water, and then pass to the east about mid-channel. During the autumnal months, therefore, the fishery is carried on at a considerable distance from the land. The boats of Mount's-Bay rarely go beyond seven leagues, but those of the French go still further into the Atlantic, and prepare their fish for their own markets by splitting and salting; this the Cornish men never do, if they can find a market for them fresh. It is at this season that the largest and best fish are taken; they are full, and perhaps rather too fat to be agreeable for the table, but they are in their healthiest condition: they are rarely with spawn. To persons accustomed to see only the fish of the narrow parts of the channels, those just migrating from deep water must appear of monstrous size. In many catches the individuals will average 18 inches in length each; but 20 and 22 inches are not of unfrequent occurrence: the largest I ever saw was in the possession of our late member Mr. E. Chirgwin, and measured 23½ inches long.

The mackerel is a fish which soon suffers from the heat of the weather, and hence the fishermen find it necessary to send their catches daily to market. But fishing so far from land, the time occupied in going to and from the markets would occupy more than three times as much as that employed in the fishing;—a waste which would be ruinous to all; for it must be remembered, that the success of a season frequently depends on three or four nights' catches, when the boats might be off their stations. To avoid this, the boats associate in companies of from five to nine, one of which takes the fish of all the others daily to market, and returns as early as possible. Each takes the office in rotation, and receives an equal share with the others of all the fish taken during

the absence. The period for which a boat may be absent depends on the distance of the market and the rapidity of sale. Cork, Bristol, and Plymouth are the most frequented ports, but notwithstanding these distances, each boat is rarely off its station more than four days; for though each receives an equal share with the others of all fish caught during its absence, yet all seem anxious to return and partake of the actual fishing. By this arrangement the fishery is never interrupted, and the greatest possible amount of success is secured.

As the autumn advances the fish pass up the English Channel in deep water, rarely rising to the surface till the approach of spring. Late in the winter, or early in the spring, they take an opposite course and again return to the west; and the boats of Mount's-Bay go eastward to meet them, making Plymouth their head quarters. The distances they advance into the channel vary almost every year; sometimes they are taken abundantly off Brighton and Hastings, and at others are found but a little to the eastward of the Start: at this period, while the Cornish boats go eastward, the Brighton boats come westward, in pursuit of the fish, and meet off the shores of Devon and Cornwall. On the return of spring the young fish approach the shore, and the taking of these constitutes the spring fishery. The fish of this season are very much smaller than those taken in the autumn; the "*schulls*" are sometimes composed entirely of fry, and at others of large and small together. In the spring the roe makes its appearance, and as summer advances it enlarges: it is this which apparently regulates their movements. Sometimes they lie at the bottom, at others wander very irregularly from spot to spot, but on the approach of summer they rise to the surface and frequent our sandy bays for the purpose of spawning. At this period they are the most sportive, and frequently add to the beauty of our lively and picturesque scenes. In the spring and autumn the drift-nets alone are used; but in summer, when they approach the shores, the seines are also employed. The time of spawning is from June to August, and it is then that they approach the shores. If the mass of fish pass to the west and south of Scilly, they pass high up the channel in deep water, and then the spawning takes place in the eastern bays, when both the autumnal

and spring fisheries are failures to the fishermen of Mount's Bay. The spawn having been deposited, the adult fish again retire to deep water to the west, around the Scilly Islands and to the Irish Sea, where they remain and fatten, till the winter migration forces them again to return and perform the evolutions of the preceding year over again. The spawn is rapidly developed into the fish, and these remain in the sheltered bays through the winter and spring. The chief reason why they are supposed not to follow the old fish into deep water is, that large quantities are frequently taken in the sheltered bays by the seines and drift-nets engaged in the late pilchard fishery. In addition to this, I am informed by the fishermen that they frequently see them in such situations, basking in large quantities at the surface, during a few warm days in winter, while the adults are in the western waters.

The mackerel is a fish of very rapid growth, for the young of one season breed early in the next.

The general movements of the mackerel, therefore, seem to be, that late in the summer they retire to the west into deep water, and there recruit themselves after the fatigues of spawning; about September and October they move to the east, and the boats go to the west to meet them; about November and December they occupy the Devonshire and eastern shores in deep water, and in January they again come westward, when the boats go to Plymouth; in February they arrive on the Cornish shores, about March, April, and May, arrive so far west as Mount's Bay, and in June hover about our bays to spawn, after which they again retire to the west. It should be remembered, however, that these movements are liable to variations and occasional revolutions, though the changes have not been very great of late. The causes of these revolutions are at present involved in much obscurity, though not to so great an extent as formerly.

The gregarious habits of the mackerel differ very essentially from those of the pilchard. The mackerel tribe are all very excitable, active, and voracious; and, like all surface-swimmers, have a high standard of respiration, low degree of muscular irritability, die soon after being removed from the water, and undergo rapid decomposition. The reverse holds good with all ground-swimmers, as may be witnessed in the eel, the shark, and

the ray. The gregarious habits, and migratory propensities, are never so strongly developed as in either the pilchard or herring. The assemblies of the pilchard are limited in extent only by the numbers of fish existing in the neighbourhood, and the "*schull*" is great or small accordingly; the mackerel assemble in comparatively small companies, and several may exist in one locality without any intermixture. The mackerel is also more uncertain; it sometimes swims high, at others low, but is always restless. The fishermen sometimes can detect their presence only by actual fishing; and hence they may be passing in deep water, while the boats are engaged near the shore, or *vice versa*, and so miss them altogether. Many nights are thus unfortunately wasted, even while the fish are abundant at a short distance from the shore. Some boats take none, or only a few, while others may be taking ten or twelve thousand per boat in a night: from these irregularities, the fishery is more uncertain than any other engaged in by our men. The largest quantity I ever saw taken was in October, 1844, when the boats of Mount's-Bay brought on shore, as the result of three nights' fishing, 1,600,000; but great as this seemed to be, it was universally considered as but small when compared with the catches of 1806: the actual amount then taken I have been unable to ascertain. Of late years I have requested several of the fishermen to ascertain the quantities captured, as far as their means would allow; these estimates of course vary, but the quantities approximate so closely, that I think they may be taken as fair statements of the produce of the fishery.

During the year 1847, the boats engaged in the drift-net fishery were 140, fishing for mackerel from January to June.

Average per boat	25,000	
Total quantity	———	3,500,000

Winter mackerel fishery, 160 boats.

Average per boat	7,000	
Total quantity	———	1,120,000
Total quantity during the year		4,620,000

The prices vary, but the average of the whole year was 10*s.* per hundred.

The fishery is very uncertain; for as the mackerel does not associate in such vast shoals as the pilchard, and as it is more active and irregular in its movements, some boats may make large catches, while others may not take enough to meet their expenses. The irregularities just mentioned are more prevalent during the spring and autumn than in the summer fishery; and this arises from the periods being so long before and after the spawning season, that the function exercises no influence on their movements.

This account of the movements of the mackerel differs from that given by Mr. Yarrell in his work on "British Fishes," but is founded on the observations made in this district during several years.

Scale of 2 Inches

Trevelloe Urn

Handle & Fragment of Boleigh Urn

Trevelloe small Urn.

Boleigh Millstone.

Kerris-vean Bowl

Trannack Urn.

Tresvennack Urn.

Fragment of neck exterior Urn

Tresvennack small Urn.

An Account of some ancient Barrows, Urns, and other Sepulchral Remains, found near Penzance.

By RICHARD EDMONDS, Jun., Esq.

AS the neighbourhood of Penzance is considered to have been one of the principal abodes of the Druids, a peculiar interest is attached to its antiquities. Having already described our cromlêhs,* I will now notice some of our remarkable barrows, with such of the urns and other ancient relics deposited in the society's museum as are represented in the accompanying plate; the figures in which were all correctly drawn from the originals, by my nephew, on a scale of two inches for a foot. I begin with the urn and millstone discovered in a barrow† at Boleigh, in the parish of St. Buryan.

The Boleigh Barrow and Urn.

In the estate of Boleigh, 4 miles S.W. by S. of Penzance, and three or four hundred yards E. of the two ancient pillars called the Pipers, a barrow was opened in 1847, within which was a kistvaen surrounded by two circular walls 4 feet high, the one about 10, the other about 18 feet in diameter, each consisting of a row of unshapen stones laid on their edges. In the midst of the kistvaen stood an earthen pot, with its mouth upwards, containing a considerable quantity of ashes. Over the whole was a large heap of stones and earth; on the removal of which the stones were formed into a high wall around the site of the tomb, which has since been converted into a sort of garden.

Amongst the stones were two beautifully-rounded mullars (*mullins* or *melins*), quite perfect, and smoothly flattened on the under surfaces, so that each resembled a spheroid with a small segment removed from one of its oblate sides: the smaller one (fig. 2) is 5 inches high and 7½ in its greatest diameter. Amongst

* Ante, p. 195. † Heaps of stones, earth, or rubbish, are here called *burrocs*.

them, also, was a flat stone 2 feet square, having in one of its surfaces a very smooth concavity or bowl, 1 foot in diameter and two or three inches deep. These might have been parts of two different kinds of hand-mill by which the Ancient Britons ground or bruised their corn.

The urn, or *bussa* (as earthen jars are here called) was, in the opinion of my informant, about 20 inches high and 16 wide,—*the largest, perhaps, yet discovered in Cornwall.* Its shell, judging from the fragments, was thicker than that of any urn in the society's museum; and its massive handles (or cleats affixed horizontally for carrying it by a rope passed through them) are each 2½ inches long, with a bore of 1 inch.* The urn was destroyed during the exhumation: two of the fragments, however, have been preserved with handles attached: these, and the mill-stone above described, I have much pleasure in presenting to the society. The handles are of much purer clay, and softer, than that of the fragments—the latter being of a black material mixed with gravel and coated on the inside and outside with a cream-coloured clay or unctuous matter, which I observed likewise on some of the stones taken from the barrow. Zigzags of double lines are on the handles as well as on the fragments (see fig. 1).

At the distance of three or four furlongs W. by S. of the field where the barrow lay, is the well known "Druidical Temple," or ancient circle of upright stones, called the *Dawns Maen*, contiguous to which numerous barrows were destroyed about two centuries ago, several having contained two or three urns each with bones and ashes.†

From the particulars now furnished, from the locality, from the absence of all coins, metallic substances, and inscriptions, and from the general custom of the Druids to burn their dead and bury the ashes, it is highly probable that this barrow was the tomb of some distinguished Briton who died before the Christian era. The Ancient Britons may have disposed of their illustrious dead in a way very similar to that of the Ancient Greeks. The corpse being

* The farmer who opened the barrow and gave me the above particulars a year afterwards, could not state whether the urn had more than two handles. Four are attached to much smaller urns in the museum of this society.

† Hals, quoted in Davies Gilbert's History of Cornwall, vol. i., p. 141.

placed on a large heap of wood, was covered with the fat of slain beasts, and when the flames were extinguished, the bones were collected, covered with fat, and deposited in an urn placed on the site of the pyre, over which a tomb was then raised. Sometimes favorite animals of the deceased were slain, and burnt on the same pile with jars of honey and sweet oil; and weapons of war,* or other things which he had been in the habit of using, were buried with him.† This practice of the Greeks, as far back as the Trojan war, may help to account for the unctuous matter, and for the utensils, found in the barrow of Boleigh.

The Trevelloe Barrow and Urns.

In the adjoining parish of Paul, immediately above Trevelloe cairn, and about a mile N.N.E. of the Boleigh barrow, another was removed in 1839, and the person who opened it informed me that it covered a circular wall 4 feet high, formed of large stones set on their edges, within which were two urns placed with their mouths downwards, the smaller one upon a concavity in a square stone, the other on a hollow scooped out of the *fast*, or hard ground beneath the soil. The large urn inclosed bones partly calcined: the small one was half filled with fine dust. These very handsome urns were presented by Edwin Ley, Esq., the proprietor of the estate of Trevelloe, to this society, and were the nucleus of its now valuable museum. The larger urn (fig. 3) has four equidistant cleats through which a cord might be passed horizontally round it for its conveyance: it is elaborately ornamented from the mouth as far down as the bottom of the cleats with horizontal and with zigzag lines, every line being of a spiral or twisted form, as if made by the impression of a thin cord. It is 13¼ inches high, 11 in its greatest diameter, 8¾ at the top, and 6½ at the base—being *precisely* of the same height, breadth, and form, and having the same number of handles, as that found in Gerrans in 1844 by Dr. Winn,‡ which he speaks of as "the largest and handsomest of the kind" he had seen: and they are both adorned with the same Vandyke pattern. These urns were therefore, in all probability,

* Ezekiel, xxxii., 27. † Iliad, xxiii., 200-320.

‡ Report of the Royal Institution of Cornwall for 1844, p. 20.

manufactured, not only within a very short period of each other, but by the same potter. Dr. Winn assigns the date of the Gerrans urn to the latter part of the second century, when the Britons might have been improved in their manufactures by the Romans; but as no Roman coins, nor other indications of Roman intercourse, were found with the urn, it may I think, with equal reason, be supposed that such improvement in British pottery resulted from intercourse with the Phœnicians, who had been trading with us long before the arrival of the Romans. The small urn (fig. 4) which is ornamented in a similar manner, is 5 inches high, $3\frac{3}{4}$ wide at the top, and $2\frac{3}{4}$ at the base.

The Kerris Vean Bowl.

In the same parish of Paul, and in the adjoining farm of Kerris Vean, near the site of the present mowhay, a grave was opened in 1844, 18 feet long, 4 wide, and 3 deep, containing fragments of urns, calcined human bones, charcoal, and a very rich black unctuous soil. A large fragment of an elegant bowl of granite was also found in it, smoothly cut inside and outside; judging from which, the bowl must have been of a circular form, 4 inches high, 14 in diameter at the top, and 8 at the base (fig. 5). The thickness (1 inch) at the top increases gradually downwards until it reaches $1\frac{3}{4}$ inch near the centre, and at the base it becomes again only 1 inch: the interior, consequently, was 12 inches wide at the top, and 3 inches deep. This depth is precisely the same as that of a much smaller circular bowl "of fine granite turned and polished," of which a fragment "was found in an old hedge belonging to the glebe of Ludgvan:"* the variation in thickness was likewise the same, or nearly so, in the one as in the other: the bases, too, of the different bowls were alike worn or rounded at the edges, so that they could not stand firmly, and the brim of each was marked "with a small drill or *sulcus* in the middle." It is probable, therefore, that these basins were used for similar purposes. Borlase considered that found in his glebe to be "a sacrificial *patera* to receive the blood of the victim," but by a less classical observer both bowls might be regarded as

* Borlase's Antiquities (2nd edit.), p. 309.

mortars for bruising corn. For this fragment the society is indebted to J. N. R. Millett, Esq., who took it from the grave.

The Tresvennach Urns and Obelisk.

To the same gentleman we are indebted for perhaps *the largest sepulchral urn in Cornwall.* It was discovered in the estate of Tresvennack in Paul, at the foot of a rude obelisk 12 feet high,* about a furlong S.W. by S. of the farm-house. While the tenant was ploughing near it, in April, 1840, the share was suddenly arrested by a granite slab, 18 inches square and 2 thick, covering the mouth of the urn. Information was immediately communicated to Mr. Millett, who went to the spot, and was thus enabled, in the name of the proprietor of the estate, to present to this society a sepulchral urn (fig. 6) much larger than the Gerrans or the Trevelloe urn, and of a much more striking character, although without any kind of ornament. It is 19½ inches high, 14 wide at the top, 15½ in its greatest diameter, and 7½ at the base: its two massive handles are each large enough to admit the hand. It was found standing on its base, 3 feet eastward of the pillar, in a vault 3 feet square, excavated in the *fast,* without any kind of kistvaen. The space between the urn and the sides of the pit was partially filled with wood ashes and small bits of human bones, whilst the larger bones and a molar human tooth were found within the vessel. A small urn (fig. 7), half filled with a fine snuff-coloured powder, and standing on its base, was discovered at the same time, 18 inches N.E. of the former, and without any cap-stone, the mouth being much broken: it was probably about 7 inches high when perfect, 5 in its broadest diameter (which is considerably below the two little knobs serving as handles), and 3½ at the base.

The Trannack Urns and Tumulus.

The two urns next to be noticed were likewise discovered in the *fast,* without a kistvaen. The following account of them is ex-

* A correct model of this pillar has been made with clay by the Misses Louisa and Matilda Millett, and presented by them to the society.

tracted from a newspaper published shortly after their discovery:—"As some laborers (in August, 1824) were digging near Trannack house, the property of William Pengilly, Esq., in the parish of Madron, they discovered an earthen urn (fig. 8) encased in part of another" (fig. 9). The former and a larger one found at the same time "contained ashes or calcined bones," and were "placed close to each other with their mouths downwards. The larger urn was about 13 inches high and 9 in diameter: the smaller one (fig. 8) 9 inches high and 7 in diameter." In addition to these particulars, Mr. Pengilly has informed me that two or three others were found in the same excavation, and that the natural floor (5 feet deep) on which they all rested was strewn with ashes and bits of charcoal. The tumulus (9 feet in diameter) which covered the whole, was very low, and had been often ploughed and sown with corn. From beneath the same tumulus was taken a smoothly-rounded piece of granite, whose greatest diameter was 4¼ inches and its least 3¼, through the middle of which was a small hole: the thickness in the centre was 1¼ inch, diminishing gradually towards the circumference.

Remarkable Barrows.

Having thus described the antiquities represented by the figures in the engraving, I will now notice some of the most remarkable barrows on the waste lands near Penzance, beginning with those on the top of Botrea hill, in Sancreed, 4¼ miles (by the map) W. by N. of Penzance, and on the south side of the road to St. Just. Four of these have their centres in a line N. and S., and consist of circular areas raised only a foot or two above the general level of the hill. The northern circle is in diameter about 60 feet, the next 100, the third 125, and the southern one 80, the respective distances (beginning from the north) being about 200, 280, and 350 feet—the whole line extending nearly 1,200 feet. If the height of the third barrow were originally in proportion to its diameter it must have been the largest in this neighbourhood. One of the little heaps in this barrow was opened in 1826, and underneath was a cavity 3½ feet long by 2 feet wide, walled with

flat stones and covered with a slab. This vault inclosed an earthen pot about 12 inches in diameter, "standing upright on the large piece of granite which formed the bottom of the cavity. The pot was of a cylindrical figure relieved towards the upper margin by a slight increase of thickness, without any ornament except a few indented strokes, and of very coarse manufacture." It contained black earth, apparently "saturated with fat or animal matter, and plentifully mixed with ashes and charred wood." * In the second circle were the remains of a kistvaen, inclosing a dark mould and two flint arrow-heads barbed and sharp pointed. On the same hill, near the southernmost barrow, are others of considerable height; one being still ten or twelve feet above the natural level of the ground.

On the next hill, towards the east, within the distance of a mile, are some other large barrows, which in the Ordnance map are called "Old Castle."

About a mile N. of "Old Castle," near Bodennar Crellas, a very large heap of stones was removed about fifteen years since, beneath which were two circular and concentric walls, 4 feet high, made with large slabs placed on their edges, the one about 6 the other about 10 feet in diameter. In removing the heap, my informant found within the inclosures four little fire-places, as he called them, formed of stones set upright, with ashes in and around them: these were probably kistvaens.

Near Little Cairn Galva, and the "Druidic Temple" called the *Nine Maidens*, are three or four barrows, one almost in contact with the "temple," and another remarkable for its great height. On Mulfra hill, four or five such heaps of stones may be seen N. of the cromlêh there. But a barrow larger than any of these is in Lady Downs, 4 miles N. of Penzance, on an eminence which commands an extensive view of the northern and southern coasts. It is about 80 feet in diameter and between 5 and 6 feet high. Large as this now is, it was much larger some years since: and two others which were near it, and of still greater magnitude,

* Dr. Barham, Trans. Royal Geol. Soc. of Cornwall, vol. iii., p. 192. See also Cotton's "Celtic Remains in the west of Cornwall," pp. 39, 42, printed in 1827.

have been lately removed, the stones being now built up into neighbouring cottages or fences.

Obelisks.

From the appearance presented by some of our large barrows, they were probably once crowned with rude unhewn obelisks; which, however, have now all disappeared,* except such as had deep foundations in the *fast:* many of them with such foundations are still standing in this neighbourhood. That about five miles from Penzance, on the right-hand side of the road to the north of St. Just, was, in Borlase's time, surrounded with a barrow which is not yet wholly removed. The Tresvennack obelisk, already noticed, has a similar foundation; and the barrow with which it was probably surrounded may have been removed when the field in which it stands was first cultivated.

As a barrow often contains several urns or kistvaens on the same floor, without any appearance of distinct periods of interment, it is possible that our heathen ancestors (like the laboring classes of our country parishes in the present day) buried their dead almost exclusively on Sundays, or on that day of the week which was dedicated to their chief god; and then all their corpses might have been brought from the surrounding district and laid on one common pyre, at such distances from each other, that after the flames had ceased, the bones of the different bodies might have been readily collected by their respective friends and deposited within urns or kistvaens, previously to the whole being covered with the common heap.

The numberless urns and graves containing human ashes, already discovered and still frequently found here, in cultivated as well as uncultivated ground, independently of the numerous barrows yet remaining on our waste lands, indicate the great population of this neighbourhood in ages when idolatry reigned throughout Europe.

Penzance, 6th October, 1848.

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* Borlase says that many of such obelisks "have been carried off for building and many still remain where they fell from their erect position." Antiquities, p. 162.

On the Vitality of the Axis of Asteroid Zoophytes.

By RICHARD Q. COUCH, M.R.C.S.,

ONE OF THE SECRETARIES.

WHEN Dr. George Johnston published his excellent work on British Zoophytes, he described the horny coverings of the *Sertularians*, and the solid axis of the *Asteroid Zoophytes*, as extravascular and inorganic. But from numerous examinations of these creatures, in all states of growth, and at all seasons of the year, I was led to doubt these conclusions, which doubts have been confirmed by subsequent investigations. I would not however have troubled the society with any reflections on the subject, if Dr. Johnston had not reiterated these views in the second edition of his work recently published. His having done so, has induced me to bring my own remarks on the subject under the notice of this society, to afford its members an opportunity of giving an opinion on so interesting a point of physiology. The Doctor's views are embodied in a quotation from Lamarck. He says, when speaking of the *Gorgonia*, that "the axis under all its modifications is inorganic, containing neither vessels nor any portion of the polypes, but formed of matter excreted by them, and afterward thickened and solidified and depurated by affinity." This, he further remarks, "is rather, on Lamarck's part, the deduction of theory than of observation, yet the opinion is in the main correct." To these points I would now direct the attention of the society. By the term extravascular, is meant, "a part not permeated by nutritious or absorbent vessels, and undergoing no interstitial change when once formed." The points for discussion are therefore clearly and fairly developed, and

I will now fairly explain my reasons for dissenting from such authorities.

The *Gorgonia verrucosa* is a shrubby and warted *Zoophyte*, with which, as it is common on all our shores, you must all be familiar. In pursuing our investigations we may divide them into three sections, embracing the bark, or fleshy crust; the axis, or solid part; and the pith, occupying the centre of the axis. The fleshy crust is external, and warted, and when dead friable: when the creature is living it is of a light vermillion colour, which in death changes to a pale yellow, or yellowish-white. In a longitudinal section, it is found to be traversed by numerous large tubes, which extend from the base of the polype cells to the central horny axis. Externally, it is hard and membranous, and on the central surface it is also membranous, and lies in contact with the axis. The tubes do not inosculate, as in the kindred genus *Alcyonium*. The spaces between the tubes are occupied by a translucent gelatinous substance, which is traversed by numerous very fine threads. The tubes vary in length according to the thickness of the bark, and they are composed of three tunics: the most internal, or the one lining the tubes, has a serous character, and in it and through it the function of reproduction is diffused: it extends from the tubes to the polypes, and forms the lining of the cells, as well as the internal parieties of the polype itself. The external surface of the polype is formed of another membrane, which is in close and intimate union with the internal one, but separates from it at the edge of the cell, and forms the coriaceous covering of the polype mass. The bark rests on the axis by means of a thickish membrane which may be called the membrane of the crust.

The axis is internal, and extends from the root to the terminations of all the branches: it is dark brown, solid, fibrous, and elastic, and gives form and stability to the whole. It is covered throughout by an investing membrane, similar to the periosteum of bones, or the liber of trees. There are therefore two membranes in contact with the axis; its own, proper to it; and the membrane of the crust. This membrane is longitudinally fibrous, elastic, and perforated with numerous oval openings, which communicate with similar openings in the membrane of the crust, which are the

terminations of the tubes of the polypes. The surface of the axis varies very much in its general appearance: it is sometimes smooth and polished; and at others marked with longitudinal furrows. The axis itself is of a dark brown in its older, and of a light brown colour in its younger portions, which are frequently membranous, while the older are stouter and more solid. It rends very readily in a longitudinal direction, but not at all transversely. In a longitudinal section, the surface is variegated with lighter and darker lines, similar to those seen in the same section of an exogenous stem; and in a transverse section the concentric layers are similarly distinct, and the central pith is fairly exposed. So that both sections present similar appearances to the same surfaces of wood; but there are differences in two important particulars which ought not to be passed unnoticed. In the first place there is the absence of the radiating medullary rays; and in the second, a complete deficiency of those cells which render wood so beautiful an object under the microscope. In the older portions of the stalk the axis is more solid and compact, and the circular layers less distinct, than in the younger branches; and the size is always in proportion to the age of the specimen. If from any cause the fleshy bark be denuded, all increase in the size of the axis is suspended; while the parts above and below the denudation increase as before; so that all growth depends on the integrity of the fleshy crust. In making longitudinal sections of the axis, numerous spots of a white cellular-looking substance are frequently observed irregularly distributed between the horny layers; and more particularly so in the bendings of the branches, especially where there are two arising closely to each other. In some specimens I have seen five or six such layers separated by only a few horny fibres. In the younger portions of some branches the bark is frequently disfigured by large protuberances, similar to those figured by Ellis as being found in *G. abietina:* this, though generally in a less degree, is also observable on the trunk and old branches. If these enlargements be dissected, they will be found to be composed of the investing membrane of the axis, elevated into a cavity, which is partially filled with a white cellular substance, identical in every respect with that previously described. This appears to be the

same substance described by Ellis as the remains of a portion of the fleshy crust which has been inclosed between the horny layers. His words are, "we frequently meet with layers of calcareous matter inclosed between the circles, which is evidently nothing else but the decayed flesh of the animal, which has been covered and inclosed by the subsequent growth of the same animal." That such inclosures occasionally take place, there can be no doubt, but they are very rare indeed, and cannot I think be the circumstances alluded to by Ellis as *frequently* occurring. These cavities are found in every part of the axis; in the older parts, and near the root, they are commonly empty, but in the trunk and branches they are most commonly partially filled, and in the newest parts the cavities are large and the contents can be accurately examined. On these points a very important question may be asked ;—were the empty cavities of the trunk ever occupied by the white cellular matter described above? (The answer should I think be in the affirmative: if not, they differ from all the more recent ones, whether in the trunk itself or in the branches) and if so, in what manner can the white matter be removed?—Questions which very materially affect the inorganic character of the axis. Before, however, touching more minutely on this point, it will be best to refer to the character of the central pith, and then the value of the evidence to be adduced will be more clearly understood. It is white and central, and runs through the trunk and all the branches: it is larger in the newer than in the older portions. In these respects it resembles the pith of the elder and other exogens, but instead of being, as in them, continuous from the trunk through all the branches, there appears to be no connexion between its distant parts. It is always divided by numerous transverse septa, which are placed at short and equidistant spaces; and in addition to this, the pith of every branch is separated by several layers of horny fibre from the part on which it rests; nor is it like vegetable piths surrounded by a ring of tracheæ and ducts. In a transverse section of a new part, it appears, under the microscope, to be irregularly cellular, and some of the cells are much larger than others, but all are in close contact. In the older portions, where the pith is small, the cellular character is destroyed, or rather

obliterated, by the cells being forced into closer contact; but in the oldest portions above the root it is frequently entirely absent.

If the substance of the fleshy bark be allowed to undergo partial decomposition, it resolves itself into lengthened cellules, which have other and smaller globular ones irregularly arranged about them. The larger ones are generally pointed at each end, with a ring of smaller ones at the base. Between these two points the body is straight, and smaller cellules are irregularly distributed over it. If these bodies are still further decomposed, they assume the form of Florence flasks, and finally are resolved into minute globular cells, which constitute the ultimate atoms of the whole crust. The union of these globules is of the most intimate kind: so closely are they united, that it is impossible to detect their points of junction.

The membranes of the crust and axis are both longitudinally striped and composed of cells similar to those described as belonging to the crust itself: the stripes, variegating their appearance, are formed by an approximation and condensation of the cellules themselves. In the membrane of the crust the lines are sometimes faintly and at others very distinctly marked: in the first case the cells are more generally distributed throughout the membrane, while in the second they are arranged in parallel lines, leaving clear spaces between them. If the membrane of the axis be examined, it will be found to be composed of the same cellular struture; but this it is not always easy to demonstrate: sometimes it is so clearly developed, that it can very easily be stripped off; at others so obscure, that it cannot be detected without great difficulty. When the membrane is well developed, the axis is rough with longitudinal rugæ; when obscure, it is smooth and polished. If the specimens be examined while alive, these rugæ will be found to be tubular, and to communicate with the oval openings in the membrane of the crust, which are connected with the polype tubes themselves: thus a communication is established between the polypes and the axis. There is a very remarkable fluctuation between the development of the membrane of the axis and that of the bark which deserves particularly to be mentioned. If the one of the axis be well marked, that of the crust is obscure, and *vice versa*; in the medium state, both are discernible. Thus, then, the

structure of both membranes is alike, and both communicate with the polypes on one side, and with the axis on the other. The membrane of the crust is at first plain, and afterwards striped and thickened, and greatly resembles the clearest state of the membrane of the axis. The membrane of the axis also undergoes similar changes; it becomes more and more obscure, and finally disappears in the substance itself. A regular series is thus undergone, from the most rudimentary development of the one membrane, to the obliteration of the other;—there is no *hiatus* or interruption: whether one membrane is convertible into the other I leave others to determine.

From these observations, it is evident that the size and condensation of the axis is dependent on the age of the specimen and the integrity of the bark: and from the communication demonstrable by dissection between the bark and the axis, an intimate union is proved to exist between them.

In making longitudinal sections of the axis, white patches are very frequently discernible in different parts: some of these have already been described. There are others, which differ in size and colour, and which always occupy the same relative position to the pith. The patches to which I now refer are white, of the same structure as the pith, and always fully occupy the cavities in which they are formed; they are always situated near the pith, and are removed from it only by a few horny fibres. The earliest state in which I have detected it, is as a minute white point; but as this increases in size, it becomes triangular, having the base towards the pith, and the apex towards the circumference: it is produced on all parts of the polypidons, but more abundantly on the newer. To this point I would now especially direct attention, as bearing on the subject under discussion. As this point increases in size, the base extends longitudinally, and parallel to the pith; the apex becomes elevated, and the horny fibres intervening between it and the circumference become thinner and thinner, and the point finally reaches the surface as a sharp elevation: this is, in fact, the first external appearance of a branch. It is covered by a continuation of the investing membrane, and all the layers of the axis formed after the branch makes its appearance take the bend of the branch,

and are continued in the direction of the new growth. Here then is a white matter formed in the midst of the layers of the axis, after the mass has been fully developed, increasing in size, removing the fibres obstructing its growth, till it reaches the surface, when it assumes the character of a branch. The pith of every branch has the same situation, and has the same origin and progress. Here then it may be observed, that an alteration does take place in a tissue supposed to be extravascular and inorganic, and consequently incapable of any alteration except decomposition. How can these circumstances be explained, unless we suppose an action going on in the midst of these layers said to be inorganic; an action which must be vital, since it forms a part of the established economy of the creature's existence? From the situation it occupies, it is placed equally beyond external influence, or the influence of either the polype or pith; and yet it passes through a variety of complicated actions of growth and absorption, to a definite end.

A still farther proof of the vitality of the axis is obtained from another source. In the *Gorgoniæ* which grow off head-lands, and near the shores, where they are disturbed by strong and irregular currents, and consequently grow more bushy than those obtained from deep water; the branches frequently cross each other. At these points of contact they become united. In most cases these adhesions occur at mere points, but sometimes for half an inch in extent. In several cases the branches become very much intertwined, and adhesion occurs at each point of contact. This adhesion I at first supposed occurred only at the edges of the opposing surfaces, but on a more careful examination the whole of the surfaces in contact were found to be united. In some cases the bark alone had been destroyed; in others the axis had been slightly worn, and others had been quite rubbed through to the pith; but, in either case, adhesions had taken place throughout the opposing surfaces. Could such unions be effected between inorganic and dead tissues? If the axis of the *Gorgonia* were inorganic; after it had been once excreted from the living tissues, it could undergo no change but what might be effected in the chemical or mechanical arrangement of its atoms: it would be, as Dr. Johnston observes, for ever placed beyond the phenomena

of what we denominate vital action. Yet in the present case we see the development of new branches, the removal of adventitious matters in the very substance of the axis, and the union of two opposing surfaces, in substance supposed to be destitute of life.

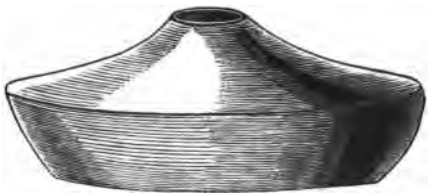
Without further trespassing on the attention of the society, I would finally observe, that from the foregoing observations the following conclusions may be drawn:—

1. That the size of the axis is always in proportion to the age of the specimen.
2. That the increase of the axis is dependent on the integrity of the fleshy crust.
3. That the white granular matter found between the layers of the axis is formed by the membrane of the axis; and that it is afterwards frequently removed.
4. That the membrane of the axis is of the same anatomical structure as the membrane of the crust.
5. That the pith is organic, and vital.
6. That the growth of branches shows an action to be going on in the substance of the axis:
7. That the union of the axis of two branches shows the same thing:
8. And that the two last, taken in connexion with the former conclusions, prove that the axis is endued with vitality during the life of the bark.

On a pair of ancient Mill-stones; and on the remains of some supposed British Villages near Penzance.

By RICHARD EDMONDS, Jun., Esq.

THE upper and nether stones of an ancient hand-mill (the former of porphyry, the latter of granite) were found in 1845, three miles W.N.W. of Penzance, on the top of the eminence immediately above the village of Trewren, in Madron. The upper stone has two cavities communicating with each other, the one above being a sort of basin to receive the corn, and the other a truncated hollow cone: the under mill-stone is nearly in the form of a truncated solid cone; and as the hollow cone makes a somewhat larger angle with the horizon than does the solid one, their grinding power is greatest near their lower edges, where they come into contact. In the top of the under stone is a hole, an inch and a half deep, wherein the spindle must have revolved to which the upper stone was fixed. The following is a correct representation of this stone, including its base, from a drawing made by my nephew:—



Both stones have circular parallel lines in their opposed surfaces, as if the one had revolved on the other; and some parts of the lower stone are polished by the friction. Each stone is 13 inches

in diameter and 4 inches thick.* No place for a handle is seen in the upper stone, as a large portion had been broken off. (*Luke* xvii., 35.)†

Mills resembling this have been discovered at Pompeii: but whether this, or the design of it, be derived from the Romans, Grecians, or Phœnicians; or whether it was used by the Ancient Britons before the visit of either of these nations, are questions on which different opinions will be entertained.

The top of the eminence on which they were found was formerly encircled with a thick wall, or mound, 125 feet in diameter, much of which still remains. Near its centre, a circular pavement, about 10 feet in diameter, was discovered, consisting of broad uncut granite slabs with small stones in the interstices: a few feet from this pavement the mill-stones lay, and also a stone 9 inches high and 2 feet in diameter, approaching the form of an oblate sphere, but with one of its sides perfectly flat, as if used for grinding on a flat surface: all these were found immediately beneath the turf. Outside, and southward of the mound were, until very recently, four or five circular inclosures, varying from 8 to 10 feet in diameter, without any distinguishable order in their location, each having an entrance about 3 feet wide, and each being formed by large slabs 3 feet high, set upright on the natural surface of the ground: one of them was particularly remarkable, from the slab on the south side of its entrance being externally like a chair on which a person might have had a convenient seat facing the east. Between these and the south-west of the eminence are extensive remains of ancient buildings, amongst which large stones are still standing, as if they had once belonged to gate or door ways: considerable excavations also may have been made there, and the *rab*,

* A handmill still common in the South of Ireland consists "of two round flat stones with the inner surfaces roughly cut all over, one of which is placed on the ground with a wooden spindle in the centre, which also passes through the upper stone, and being attached to a wooden handle the mill is easily set a going."—*West Briton*, 8th Dec., 1848.

† Fragments of larger *upper* mill-stones, very similar to the above, were recently found in the estate of Tregonebris, among the remains of a supposed British village, and have been presented to this society by the Misses Comyn of Sancreed Vicarage; but I am not aware that any *nether* mill-stone like that now described is yet recorded to have been found in Cornwall.

or subsoil, may have been carried to the top of the eminence in order to form the mound which consists principally of that material, and does not appear to have been thrown up from any adjoining ditch. The *round* and the various remains occupy a space of between two and three acres: they are now, however, much less interesting than they were a few years ago, before the choicest of the stones were removed for rebuilding the neighbouring bridge in the road to St. Just. The tenant, Mr. John Daniel, who brought me the hand-mill, drew my attention to many instances of this recent spoliation: several of the slabs forming the small circular inclosures had been removed; and, amongst the rest, that singular one above described, called "the chair."

About a mile west of Trewren, and immediately above the village of Higher Bodinnar, are some very ancient ruins, called *The Crellâs.* "In the southern part of this plot (says Borlase*) you may with some difficulty enter into a hole, faced on each side with a stone wall, and covered with flat stones. Great part of the walls as well as covering, are fallen into the cave, which does not run in a straight line but turns to the left hand at a small distance from the place where I entered, and seems to have branched itself out much farther than I could then trace it, which did not exceed 20 feet. It is about 5 feet high and as much in width." Borlase imagined these ruins to have been a British town, and the cave a private way into it; but it seems more probable that the cave itself was the dwelling-place of those who made it. My reason for thus thinking will presently be seen. Near the site of this cave, which has since wholly disappeared, are the remains of a *round* like that at Trewren, although not quite so large, within which my nephew, who accompanied me, found in a mole-heap, a fragment of the upper part of a vessel of coarse dark pottery, whose diameter must have been about 12 inches; the top, which is much thicker than the rest, has a flat brim projecting horizontally over the outside: it is without ornament, and has no glazing, but the inner surface is coated with a sort of brick, and the outside with a black polish, proceeding apparently from the pulverizing of some particles of its substance by the friction of a rope used for its con-

* Antiquities. p. 273.

veyance. This discovery of ancient pottery in the *round* close by what Borlase imagined to be the ruins of a British town, tends to confirm the conjecture of the learned antiquarian. Barrows, too, have been found near the spot; and within a mile, towards the south, on the tops of two high hills, are many large ones noticed in a former Paper (p. 234).

At the northern extremity of the same Crellâs, and about half a furlong from the site of the cave, are two circular or oval inclosures formed by very thick walls covered with furze, and communicating with each other; the one 18 feet in diameter, the other more than thrice that width. The smaller inclosure had no opening except into the larger. Inside and parallel with the larger wall, is another wall, with an intervening ditch between 4 and 5 feet wide. This ditch (like the winding cave described by Borlase) might have been originally roofed with large flat stones and occupied as a dwelling-place by the Ancient Britons, while the grass-plot in the centre might have served for the protection of their cattle in times of danger. There was only one entrance communicating with the adjoining grounds, and that was southward, by a straight passage through the outer and inner walls. Borlase says that a similar opening through *both* walls was also on the opposite or northern side, but I could discover no opening in that direction, except merely through the *inner* wall into the ditch. (See the woodcut at the close of this Paper). The small inclosure on the west may have been a sort of refectory or sitting-room, and the descent from it into the double-walled green area on the east, is by a central passage nearly 6 feet wide, leading between two large slabs, still standing, more than 4½ feet above ground, with their edges E. and W. This higher inclosure, and the ditch between the two walls of the lower one, would, when roofed and thickly covered with growing furze (like the cave at Boleigh presently to be mentioned), have formed an excellent hiding-place and a dry and well sheltered habitation, while the open area in the centre would have served as a place of recreation for the occupants, if not required for their cattle.*

* The ancient barrow recently opened at Boleigh, and another only two or three furlongs W. of the Crellâs, were likewise double-walled (ante, pp. 229, 235), as if the abodes of the dead had been formed after the habitations of the living.

Near the village of Bojuthno, and about 500 feet E.N.E. of the circles last described, there appears to have been a similar structure, overgrown with broom, adjoining the north side of the lane leading to New-bridge, but the remains are fast disappearing, and little now can be seen but some upright stones of the wall round the grass-plot.

The ruins at Bojuthno, as well as those at Bodinnar, are called *The Crellâs*—those at Trewren *The Cryglâs*, the former name being, probably, a mere corruption of the latter, by the common practice of rendering the *g* mute, as in the Italian.* The word *cryglâs* signifies "a green mound or hillock," and may have arisen either from the green inclosures within or adjoining these heaps of ruins, or from the furze, broom, or other evergreens that concealed them. Now, as the ruins at Trewren, Bojuthno, and Bodinnar thus appear to have been all called by the same name, they were probably of a similar nature; and I see no reason why we may not adopt the opinion entertained by the neighbouring population and regard them as the remains of ancient British dwelling-places.

The common description of a primitive British dwelling is a mere pit not more than 4 feet deep and 10 feet wide, edged with a low wall, and roofed with branches of trees meeting in a point like a beehive, and covered with reeds or turf. But when stones were easily obtained, as at Trewren, or when increased experience or other circumstances suggested, a different kind of habitation was made. Four miles from Penzance, between the villages of Trewoofe and Boleigh, is a supposed ancient British residence in excellent preservation, called *The Fowgo*, constructed in the following manner. In a spot overgrown with furze, a trench was made 36 feet long, from which other trenches branched in various directions, all the excavations being lined or faced with large stones, across which long stone posts were placed close together to form the roofs, which were then overlaid with earth and planted with furze, to render the cave undistinguishable from the adjoining grounds: no mark of a tool can be seen. The breadth of these

* An example of this occurs in the name of the most ancient borough in Mount's-bay, which, although spelt on its corporate seal *Marghasion*, is now always written *Marazion*.

chambers is about 5 feet, and their average height between 6 and 7 feet, so that they are sufficiently large for several families to dwell together, as appears to have been the custom in the time of Cæsar.* At the west end of the main excavation is an entrance by a descending path, which, as well as the cave itself, is so well concealed that the whole looks precisely like an ordinary furze brake. Approaching to this kind of habitation, probably, were the cave and circular walls at Bodinnar and the ruins at Bojuthno; but the original form of the buildings at Trewren, with the exception of the small circular inclosures, I cannot imagine.

In conclusion, it may be observed that the ancient dwellings in this extremity of Cornwall might have been of a more varied character than those of any other locality in Britain; owing partly to our hills and peninsular situation offering so many sites for castles and strongholds, partly to the abundance of convenient building materials, and partly to our intercourse with the Phœnicians, in whose land, as well as in this neighbourhood, the inhabitants when in danger "did hide themselves in caves, and in thickets, and in rocks, and in high places, and in pits."—(1 *Sam.* xiii., 6.)

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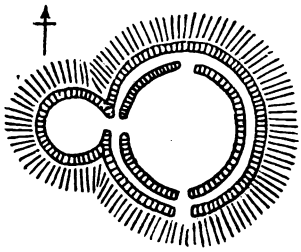
* De Bell. Gall., v., 10.



Land and Fresh-water Shells, found in the neighbourhood of Penzance:

By Masters JOHN and THOMAS HENNELL.

The Names are from Gray.

Ancylus fluviatilis	In clear running streams: abundant.
Balea perversa.....	On trees.
Bithinia ventricosa	On pieces of the bark of trees lying at the side of the path leading through Rosehill to Polteggan mill-pond.
Bulimus acutus	Marazion Green.
——— *Lachamensis* ..	Very rare; on trees in gardens.
——— *obscurus*.....	Rare; in gardens: at the Towans.
Carychium minimum ..	Towans.
Clausilia biplicata.....	On banks under stones, and on trees.
——— *nigricans*.....	On banks.
Conovulus bidentatus...	Ditto, and at the Towans.
——— *denticulatus*..	At the Battery rocks, Whitsand-bay, and Porth-curno cove: dead.
Cyclas cornea.....	Trengwainton pond: common.
Helix aculeata.....	Among decayed leaves.
—— *aspersa*.....	On banks and walls.
—— *caperata*	Lamorna cove and Hayle.
—— *ericetorum*.....	The Towans; dead specimens: alive at Sennen.
—— *fulva*	Towans; very rare: dead specimens.
—— *fusca*	Marazion Green.
—— *granulata*	Among decayed leaves.
—— *hispida*	Under stones in moist places.
—— *hortensis*	On moist banks.

Helix nemoralis ..... On moist banks.
—— *Pisana* ..... On sandy hillocks, near the Signal-house, St. Ives.
—— *pulchella* ..... On the Towans; dead specimens: Mr. Couch has found them alive at Trereife, Alverton road.
—— *rufescens* ..... Under nettles in shady places.
—— *virgata* ..... Marazion Green.
Limnæus glaber ..... In a little rivulet on the top of the hill on the road leading to Trevayler through Treneere.
—— *palustris* ..... Dead specimens at Whitsand-bay.
—— *pereger* ..... In muddy pools.
—— *truncatulus* .. In gently running rivulets.
Pisidium amnicum .... In a pool at Castle Horneck gate, and at Trengwainton ponds.
—— *pusillum* ..... Trevethow pond.
Planorbis imbricatus... In a pond at Kerris: common.
—— *lævis* ..... Trevethow pond.
—— *vortex* ..... In a pond at Kerris.
Pupa Anglica ..... At the foot of trees, and under stones in banks.
—— *marginata* ..... Towans.
—— *umbilicata* ..... At the foot of trees, and under stones in banks.
Succinea Pfeifferi..... In a small stream at Whitsand-bay, and Alverton road.
Vertigo edentula ..... On trunks of decayed trees.
—— *pygmæa* ..... Towans: common.
Vitrina pellucida ..... On the banks of a lane branching off from the Alverton road, near its end.
Zonites alliarius ..... Under stones in moist places.
—— *cellarius* ..... Ditto.
—— *nitidulus* ..... On dry banks.
—— *pygmæus*..... In Whitsand-bay sand.
—— *rotundatus*..... Under stones in moist places.
Zua lubrica ..... Towans.

For the following Report of the Exportation of the Pilchards we are indebted to T. S. BOLITHO, Esq.:—

Penzance, 24th January, 1848.

The quantity of pilchards caught during the past season, has been larger than it has been in any one season for upwards of thirty years.

During the last week of July, and the first three weeks of August about 8,000 hogsheads were cured; of which 2,000 hogsheads were caught eastward of the Lizard, and the remainder in Mount's Bay, chiefly in drift nets. The quality of the summer fish was better than usual.

In September, about 1,600 hogsheads, of middling quality, were caught at St. Ives.

Early in October, about 3,000 hogsheads were caught at Newquay, nearly half of which were consumed at home; and shortly afterwards about 4,500 hogsheads at St. Ives; all of good quality.

On the 1st November, upwards of 22,000 hogsheads were taken at St. Ives, of which about 19,500 hogsheads were cured, and about 1,200 hogsheads in Mount's Bay; these were of remarkably fine quality; and during the last week of November, a further quantity of about 4,000 hogsheads were secured at St. Ives.

The price of the summer fish to the curers ruled from 35*s.* to 37*s.* per hogshead.

The prices of the September and October fish ranged from 34*s.* to 38*s.*; some of the November fish were sold at 32*s.* and 34*s.*; but as the season advanced, the curers demanded much higher prices. The result has been that a very large proportion of the whole has been shipped on Curers' Account, and many orders have been left unexecuted. The home consumption has been very large.

The total quantity exported appears to be 40,883 hogsheads, to which must be added the quantity left from 1846 (1,540 hogsheads at Naples, and 2,450 hogsheads at Venice), making the total supply 44,873 hogsheads.

The actual consumption of 1846–7, was 37,210 hogsheads; but inasmuch as the consumption up to the end of December, 1847, was much greater than it was up to the same period of 1846, it is thought by many that the stock on the 1st May, 1848, will not be larger than it was on the 1st May, 1847.

PILCHARDS EXPORTED, 1847.

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
Albert	387	St. Ives	22 September		387	..	..	..
Superior	400	Penzance	23 „	400	..	..	..	..
Mount' Bay	308	Ditto	30 „		308	..	..	..
Wizard	500	Ditto	1 October				500	..
Reform	500	Ditto	3 „		500	..	..	..
William Harris	526	Mevagissey	12 „				526	..
Dexterous	550	Ditto	13 „			550	..	..
Supply	507	Penzance	13 „					507
Prince Albert	556	Ditto	14 „				556	..
Hayle	660	Ditto	16 „					660
Pomona	392	Ditto	17 „	392	..	..	..	..
Rovena	590	Ditto	19 „					590
Mary Stewart	450	Ditto	22 „				450	..
Trial	583	Mevagissey	22 „					583
Racer	550	St. Ives	29 „					550
Gem	654	Penzance	29 „	654	..	..	..	..
David Banks	593	St. Ives	30 „				593	..
Bolina	310	Falmouth	30 „		310	..	..	..
Pomona	681	Penzance	9 November				681	..
Arundell	523	St. Ives	9 „		523	..	..	..
Carried forward..	10,220			1,446	2,028	550	3,306	2,890

Pilchards Exported, 1847—*continued.*

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
Brought forward.	10220	.....	.....	1,446	2028	550	3306	2890
Eliza Fox ..	351	St. Ives	18 November	.....	.....	.....	351	..
Sophia	578	Ditto	20 „ ..	.....	.....	.....	.....	578
Brilliant	500	Newquay ..	20 „	.....	500	..	..	..
Quicksilver	490	Ditto	27 „	490	..	..	..	..
St. Aubyn ..	454	St. Ives	4 December	.....	.....	454	..	..
Kate (540 Hhds.) .	*Lost*	Ditto	10 „	..	..	..	..	..
Compeer	600	Ditto ..	11 „	.....	.....	.....	.....	600
Cynosure	600	Ditto	11 „	.....	.....	.....	600	..
John and Mary ..	561	Newquay	12 „	.....	.....	.....	.....	561
Comet	470	St. Ives ...	12 „ ..	.....	.....	.....	470	..
Brilliant	480	Ditto ..	12 „	.....	480	..	..	..
Jane	600	Ditto	16 „	.....	.....	.....	.....	600
Ann ..	380	Ditto	20 „	.....	.....	.....	380	..
Nimble	428	Ditto	20 „ ..	.....	428	..	..	..
Flying Fish	500	Ditto ..	20 „	.....	.....	.....	500	..
Earl of Devon	650	Ditto	20 „	.....	.....	.....	.....	650
Grecian Queen ..	700	Ditto	21 „	.....	.....	.....	.....	700
James Wearne	710	Ditto	21 „ ..	.....	.....	.....	710	..
Kate	378	Ditto ..	21 „	.....	.....	.....	.....	378
Carried forward..	19,650	.....	.....	1,936	3,436	1,004	6,317	6,957

Pilchards Exported, 1847—*continued.*

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
Brought forward.	19650	.....	.....	1936	3436	1004	6317	6957
Presto	650	Penzance	23 December ..	.....	.....	.....	650	..
Storm ..	650	St. Ives ...	24 „	.....	.....	.....	.....	650
British Queen	588	Ditto ..	24 „ ..	.....	588	..	..	..
Hematope	400	Ditto	25 „	400	..	..	..	..
Julia	600	Ditto	25 „	.....	.....	.....	.....	600
John Cobbold ..	600	Ditto	25 „	600	..	..	..	..
Sir Robert Peel ...	405	Ditto ..	25 „ ..	.....	405	..	..	..
Salome	550	Ditto	27 „	.....	.....	.....	550	..
Windsworth	570	Ditto	30 „	.....	570	..	..	..
Paroquet ..	600	Ditto	31 „	.....	.....	.....	600	..
Observer	600	Ditto ..	31 „ ..	.....	.....	.....	.....	600
Vesper	537	Ditto	31 „	.....	537	..	..	..
Jane	610	Ditto	2 Jan., 1848 ..	.....	.....	.....	.....	610
Princess Victoria ..	600	Ditto	2 „	.....	.....	.....	600	..
Vivid	480	Ditto ..	2 „	.....	.....	.....	480	..
Patriot	573	Penzance	5 „	.....	.....	573	..	..
Mincarlo	550	St. Ives	6 „ ..	.....	550	..	..	..
Providential ..	700	Ditto	6 „	.....	.....	.....	.....	700
Triumphant	623	Ditto ..	6 „	.....	.....	.....	623	..
Carried forward.	30,536	.....	.....	2,936	6,086	1,577	9,820	10,117

PILCHARDS EXPORTED, 1847—*continued.*

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
Brought forward.	30536	.....	.....	2936	6086	1577	9820	10117
Joseph Cristall ..	625	St. Ives	7 Jan., 1848	.....	.....	.....	625	..
Naiad	609	Ditto	7 „ ..	.....	.....	.....	609	..
Eliza	550	Ditto ..	7 „	.....	.....	.....	550	..
Premier	470	Ditto	7 „	.....	.....	.....	470	..
Little Briton ..	460	Ditto	8 „	460	..	..	..	..
Dartmouth	440	Ditto	8 „ ..	.....	.....	.....	440	..
Highland Lad ..	550	Ditto ..	9 „	.....	.....	.....	550	..
Brilliant	409	Ditto	10 „	.....	.....	409	..	..
Wanderer	400	Ditto	11 „	.....	400	..	..	..
Bezaleel	700	Ditto	13 „ ..	.....	700	..	..	..
Sharon ..	763	Ditto ..	13 „	.....	.....	.....	763	..
Lara	494	Ditto	13 „	.....	.....	.....	494	..
Harriet	594	Ditto	14 „	.....	.....	.....	594	..
Invincible	650	Ditto ...	14 „ ..	.....	.....	.....	.....	650
Lotus ..	610	Ditto ..	15 „	.....	.....	.....	610	..
Azores Packet	385	Ditto	15 „	.....	385	..	..	..
Panope	536	Ditto	19 „	.....	.....	.....	536	..
Elizabeth Whyte ..	421	Ditto	20 „ ..	.....	421	..	..	..
Acastus	681	Ditto ..	23 „	.....	.....	.....	681	..
Total	40,883	.....	.....	3,396	7,992	1,986	16,742	10,767

Penzance, 6th January, 1849.

The Pilchard Fishery of 1848 has been very unsuccessful,* the whole quantity cured being less than 8,000 hogsheads; of these about 4,600 hogsheads were cured in August (3,000 hogsheads in Mount's Bay, and the remainder eastward of the Lizard); fair quality summer fish, which sold at prices varying from 37*s.* to 41*s.* per hogshead (exclusive of charges and commission). In October, about 3,000 hogsheads were caught at St. Ives, fine autumnal quality, and which were sold at 60*s.* per hogshead, with the exception of one cargo, which fetched 63*s.*

* The failure of the fishery occurred among the northern or winter shoals. The quantities taken from July to October were much the same as those taken at other seasons. The winter shoals passed Newquay and St. Ives in deep water and swam very low near the ground; hence the November catches, which during late years have constituted the harvest of the year, were too small even to supply the home consumption.

PILCHARDS EXPORTED, 1848.

Vessels.	Hhds.	Port of Shipment.	Date of Sailing.	DESTINATION.				
				Genoa.	Leghorn.	Civita Vecchia.	Naples.	Adriatic.
William Canynges	503	Penzance	10 October		503	..	..	..
Mary Stewart	468	Ditto	10 „	468	..	..	..	..
Little Pet	525	Ditto	12 „				525	..
Palmyra	425	Ditto	14 „				425	..
Killiow	425	Ditto	14 „			425	..	..
William Harris	524	Mevagissey	14 „				524	..
Roseland	550	Ditto	17 „					550
Celerity	420	Penzance	18 „					420
Mount's Bay	295	Ditto	31 „	295	..	..	..	..
Pet	477	Falmouth	6 November	477	..	..	..	..
Joanna	550	St. Ives	19 December	550	..	..	..	..
Racer	550	Ditto	19 „		550	..	..	..
Eagle Wing	540	Ditto	19 „				540	..
Blanche	449	Ditto	19 „	449	..	..	..	..
Providential	588	Ditto	21 „				588	..
Ann	304	Penzance	6 Jan., 1849				304	..
Total	7,593			2,239	1,053	425	2,906	970

PROCEEDINGS OF THE GENERAL MEETING

OF THE

Antiquarian & Natural History Society

OF PENZANCE,

HELD IN THE TOWN COUNCIL ROOM, 6TH OF OCT., 1849,

The President, JOSEPH CARNE, Esq., in the Chair.

The following gentlemen were elected the Officers and Council for the ensuing year:—

President.

Joseph Carne, Esq., F.R.S.

Vice-Presidents.

John Batten, Esq. | Richard Pearce, Esq.
Rev. Charles Moore.

Council.

A. Berryman, Esq.	Walter Borlase, Esq.	Jas. Flamank, Esq.
J. J. A. Boase, Esq.	T. S. Bolitho, Esq.	Rev. C. V. Le Grice.
S. Borlase, Esq.	Thos. Darke, Esq.	Richard Millett, Esq.

Rev. M. N. Peters. | L. R. Willan, Esq.

Treasurer.

Richard Long, Esq.

Secretaries and Curators.

E. H. Rodd, Esq. | J. N. R. Millett, Esq.
Richard Q. Couch, Esq.

DONATIONS TO THE SOCIETY

FOR 1849.

DONORS.	SPECIMENS.
Misses Matilda & Louisa Millett.	Model of Castle-an-Dinas.
Mrs. Richard Moyle	Gold shells, and shark's head.
Mr. Wm. Herbert Nicholas ...	Lime, deposited from boiling spring of Lipso, on the island of Negrepon, near the town of Calshis, in Greece.
Mr. N. Hare, Jun.	Rubbings from ancient brasses; and nest and egg of the Dartford warbler.
Mr. W. Cocks.....	Series of shells; specimens of *Crustacea* (many very rare); and star fishes.
Master Tracey Millett	Specimens of insect architecture.
Mr. W. Cocks	Cloths made for waterproof.
Owners of the brig *Mary Jones*.	Moth & butterflies, from Brazil.
Mr. W. Cocks	Lists of natural history, from Falmouth.
Mr. Humphry Pascoe	Variety of meadow pippit.
Mr. Edward Hearle Rodd	Crested titmouse.
Master F. B. Edmonds	Ancient pottery, from a supposed British town near Higher Bodinnar, in Sancreed; and also a drawing of the Tolmên, in Constantine.
Miss Lavars.....	Two cabinets of shells, Cornish and foreign.
Mrs. Gulson	Land and fresh-water shells.

PRESIDENT'S ADDRESS.

AT the time when the last annual meeting of the society was held, I was a wanderer in search of health, and therefore unable to occupy the situation which I now fill; but I have no doubt that the proceedings at that meeting gave an impulse to the society which has been felt ever since.

In meetings of this nature, the principal pleasure arises from observing the progress and advancement of a society in the objects for which it was instituted; and that this society is thus steadily advancing will not be doubted by those who have perused the transactions published with the last Report, or who shall observe, as they may now do, the number and the nature of the communications which have been made, and the models and specimens which have been presented to the society in the course of the last year.

In alluding, in the first place, to the museum, I cannot refrain, even at the risk of intruding on the province of the council in making their report, from noticing one or two circumstances connected with it.

Amidst many additions which have been lately made to the natural history department, there is one which deserves especial notice. The late Miss Lavars employed herself for several years in making a collection of shells, which, at the suggestion of one of our members, she desired at her decease should be given

to our society. This event has taken place since our last meeting, and her relatives have most honorably fulfilled her wish. The shells are contained in two small cabinets: one is confined to a collection of the Porthcurno shells, which is doubtless the most complete that has been made; the other contains a variety of British and foreign shells which will fill up many chasms in our collection.

Another donation I must not omit to mention, as it evinces such praiseworthy attention to natural history in very early life. There is on the table a case containing a number of small specimens illustrative of insect architecture: these have been collected and arranged by Master Tracey Millett, the nephew of the Ladies to whom we owe so many of our models.

But these additions to our cabinets, although they are important, they are yet but secondary. It is possible that some may consider a large collection of specimens, well arranged, and beautifully laid out, as the end—the ultimate purpose, of the society; instead of regarding the Institution as formed expressly to excite its members and others to the study of natural science, and its museum as a means—certainly a most efficient means, of aiding them in their pursuit.

At the last meeting of the British Association, allusion was especially made to two subjects connected with natural history. A grant was made to Professor Forbes for a Report on British Worms, a subject which has attracted less notice than perhaps any other branch of the science: it had however previously occupied the attention of a member of our society, who will to-day make a communication on the subject, and who has commenced a collection of the worms of this district, which already amounts to a considerable number. The Association also recommended that the subject of the Luminosity of the Sea should be investigated during the next year: on this subject also a Paper will be presented to us to-day.

Great discoveries of new species, and even new genera, of marine invertebrated animals, have been lately made by dredging.

The dredge has till lately been used principally for procuring oysters and flat fish, and marine matter for manure, but late

experiments have shewn that it may be made a grand instrument of scientific discovery. In a communication made to the Liverpool Literary and Philosophical Society a little time ago by Mr. Mc. Andrew, we have an account of dredging on a very large scale. That gentleman having a large pleasure yacht, resolved, merely for his recreation, to procure a dredge large and strong enough to explore the bottom of the sea from the Scilly to the Shetland islands, and often has he dredged at the depth of 150 fathoms. The result was most surprising. Amidst an immense mass of marine detritus brought up by the dredge, Professor Edward Forbes, who was with him in Shetland, described and figured from life not fewer than 100 animals, the greater proportion of which were entirely new, and the remainder had been only imperfectly or erroneously described before.

I may observe in passing that another discovery was the result of this dredging, and of Professor Forbes' dredging in the Mediterranean,—that whilst there are some animals which are found at all depths, and in almost every sea, yet in general the sea may, with respect to its inhabitants, be divided into zones. At the depth suppose of 30 fathoms, certain species of animals are found which exist there alone: from 30 to 60 fathoms certain others are found which exist no shallower or deeper; and so with respect to all greater depths. These researches are yet in their infancy, but if they be extensively carried out, and the facts alluded to, be completely established, we may ultimately be able to ascertain at what depth, and in what climates, we may expect to find certain species of animals in the sea, as certainly as we know in what strata we shall find certain organic remains in the earth. These researches may also have an important bearing on geology.

Much, I am persuaded, may be done for the benefit of our society, by the adoption of similar measures on a much smaller scale, to explore our own bay.

There are perhaps few places of equal size, where there are more boats and small yachts kept for pleasure. How easily might a small dredging apparatus be applied to these. This, in fact, has been already done by some of our members with great success: others have frequently watched the fishermen's dredging boats,

and by these means several animals of the *Molluscan*, *Crustacean*, and *Zoophite* orders have been discovered, which were not before known as inhabitants of these parts, and in one instance, a *Coral* not yet described. I would beg to suggest, for the consideration of the new council whether a small reward to the fishermen for the preservation of the detritus or refuse brought up by their dredges would not be usefully applied, and perhaps no one could perform a more useful service to the society than to watch those boats and secure the refuse for examination.

With respect to the other branch of our pursuit, viz., Antiquities, I am happy to call your attention to the result of the continuous efforts of the Ladies who have already so materially served the society,—the Misses Millett. All the models which were in progress at the time of the last meeting are now completed and deposited in the museum.

Our most cordial thanks are due to them for what they have already done, and I may add for what they intend to do, for knowing the inadequacy of our funds, and of our present room to properly exhibit, and even to contain, our collection, they have proposed to get up a Bazaar to aid us in obtaining a better place, and more efficiently supporting the institution. I beg to express a hope that many others will unite with them in this most useful work, and that in the ensuing spring we may witness its successful result.

I would, add, on the subject of antiquities, that there are but two cromlêhs in the county of which we have not models, one being on Carwinen in Camborne, and the other near Liskeard. The distance of these has doubtless prevented our obtaining models of them; as well as of many other monuments, both in Cornwall and in the Scilly Islands.

I must here make an observation on one of the relics of antiquity in this neighbourhood. I was informed some time ago that a croft in the parish of Madron, on which stood one of the inscribed stones of which we possess the model, was about to be improved, and it was probable that the stone would be taken up. I immediately sent a message to the tenant, requesting him to let it continue in its old situation, but if he was determined to remove it, I would gladly

fetch it away. I received no answer to my communication, but I was informed a few days ago that it had been actually taken up and was lying on the ground. I would therefore suggest that our secretaries be requested to negociate with the tenant for leave to remove this ancient monument, and to place it in another situation in or near the town.

I cannot omit, in conclusion, to bear testimony to the efficient services of our treasurer Mr. Long, and to hope that he may long give us his valuable assistance in this office.

I fear that in the remarks that I have made, I may have trenched in some degree on the report, which I will now call upon one of your secretaries to read.

REPORT.

THE council, at the close of their official year, have great pleasure in reporting to the society the progress which has been made in the different departments of their investigations since the last annual meeting. It must be at all times a pleasant task to be able to report progress in the various pursuits in which we may be engaged, but the pleasure is greatly increased when, in addition to this, we are enabled to direct the attention of the society to the fact that our pursuits have been extended, and have been more successful in proportion to the enlargement of our designs.

When our society was first established, it was intended for the collection and the preservation of the antiquities of our neighbourhood, and such objects of natural history as occurred within our district. The specimens already in our possession testify to the zeal with which these designs have been carried out.

The council during the past year have, through the president, found it necessary to interfere for the preservation of some of those monuments of antiquity which adorn our neighbourhood, but which cannot be deposited in our museum. They hope that all the landed prorietors, having such valuable relics of our ancestors on their estates, will assist our society in its endeavours to secure them from mutilation. Stone is so abundant throughout our district,

that no inconvenience can possibly be felt by any one, in taking it in other localities. The council would now direct attention to the fact, that, in addition to the preservation of these antiquities, they have been studied also with reference to their meaning, and the purposes for which they were designed. During the past year, we have been favored with remarks on an ancient British village, from the pen of the same Ladies who have already enriched our museum with the beautiful models of the Druidical remains found in this district. This is an almost unbeaten path; and the council hope that they will continue in it. We have also been favored with communications from Mr. Edmonds, on similar subjects.

In the department of natural history, we have been actively engaged, as in former years. In the different departments, into which our pursuits are divided, we have had great activity and zeal displayed; and though not equally successful in each division, yet in several our exertions have been rewarded, not only with additions to our *Fauna*, but even to science. During the past year a dredge has been frequently employed for our benefit: for this we are again indebted to the zeal of a Lady, who is not only enriching her own cabinet, but also making additions to our museum. The objects of interest discovered by this means have been both numerous and valuable; indeed, so great are the materials thus placed at our disposal, that we know not how to arrange them, entirely from want of space. Among the varieties thus discovered, we would mention that rare *Crustacean*, Cranch's spider-crab *(Archæus Cranchii)*, discovered by Mr. Cranch off Falmouth, the only English specimen of which is deposited in the British Museum; Mr. J. P. Thompson has discovered another specimen in Ireland, which he has deposited in the Museum of the Royal College of Surgeons, Dublin; so that the specimen now in our possession is a very valuable one. In this department, we have received several valuable presents from W. P. Cocks, Esq., of Falmouth, and among others, of the arch-fronted swimming-crab *(Portunus arcuatus)* and a fine specimen of the floating-crab *(Planes Linnæana)*: these and many other varieties are waiting on the society for accommodation in our collection.

ORNITHOLOGY.

Although very general attention has been given to this branch of our society, by those who in the town and neighbourhood are interested in its welfare, it is to be regretted that the society has less to boast of in the past year, as accessions of novelty to the museum, than in any of the former ones; there is however nothing to discourage a perfect confidence in the steady progress of this popular department of natural history. It must be remembered that the natural advantages of the locality of the district were, upon the formation of the society, eagerly laid hold of. In consequence of this, many very valuable and rare birds were at once brought together, and these with the more common species have assisted in the formation of an interesting and valuable collection of native birds. It is therefore not difficult to reconcile the cause of this falling off, when the means of procuring them are less, and the desiderata are becoming less. The past winter was remarkable for its extreme mildness, and as a natural consequence there was a scarcity of our usual winter visitants, and especially of the rarer species of the extensive and interesting family of the *Anatidæ*. During the past summer several specimens of that curious little bird, the grasshopper warbler *(Salicaria locastella)*, have been detected in this neighbourhood, and throughout the county; and it is to be hoped, that as the society has been favoured with a donation of the nest and eggs of one of the most shy of our small birds,—viz., the Dartford warbler, whose nidification is at all times most difficult to detect, it may be fortunate enough to receive, at no distant period, specimens of the nest and eggs of the *Salicaria locastella*, which would be a valuable addition to any museum. Two specimens of the smaller species of stint *(Tringa Temminckii)* have been procured this autumn from our immediate neighbourhood, and it may be mentioned, that just about the same period last year our district afforded another example of this bird, thus shewing the importance of attention being given at the periods of the year when the autumnal and vernal movements in migration take place, to

the probable chances of this highly-favoured district presenting interesting ornithological specimens. Several specimens of the squacco heron *(Ardea comata,* or *Ralloides)* have been procured during the last spring, from various parts of this district, presenting different grades of progressive nuptial plumage. The most interesting specimen obtained was from the Land's-end, exhibiting its spring plumage almost perfected, the elegance of which has characterized it as being one of the most graceful and beautiful of the smaller *Ardeidæ*. About the same time was procured from Scilly a beautiful specimen of an adult night heron *(Ardea nycticorax)* in full spring plumage. Lately, from the same locality, a specimen of the black-tailed godwit *(Limoza melinura)*, a species far less numerous than its congener the bar-tailed godwit, was received. All these species have been before killed in this neighbourhood at different times, but their appearance is so uncertain, and oftentimes at such very distant periods, that their detection at any time is a source of interest, and demands a record. Two other species may be regarded as addenda to our Cornish *Fauna* since our last meeting; viz.,—the reed wren *(Salicaria arundinacea)*, and the pied flycatcher *(Musicapa luctuosa)*: both these species were captured at Scilly within the last week. Although the appearance of these birds may be regarded as occasioned by the accidental occurrence of strong easterly winds prevailing and overtaking them in their migratory passage southward, still the council are tempted again to call attention to the importance of watching the migratory seasons in a locality like ours, as calculated to afford subjects of novelty and interest.

ICHTHYOLOGY.

Among the fish, although we have not to notice the capture of many, yet we have to record the capture of one new to our *Fauna*, an account of which will be read to-day; and what is of equal importance, we have again to record the migrations of the pilchard. Every thing connected with the habits of this fish must interest us all, since it is so intimately mixed up with the

commercial welfare of our county. The council therefore venture to offer to the notice of the society the results of their experience during the past season. The early progress of the shoals was similar to that described in a Paper, on the Migrations of the Pilchard, contained in our report. After their arrival on our north-western shores, more particularly about Cape Cornwall, a portion passed into St. Ives and our northern waters; the largest division however passed southward, round the Land's-end and into the western portions of Mount's Bay, but they kept in deeper water than usual, and this is the second season in which this has been the case. A small portion remained in the Mount's Bay, the larger passed the Lizard, to Veryan, Mevagissey, and Whitsand Bay, near Plymouth. While this was taking place on the south coast, the northern shoals were congregating, in moderately deep water, from St. Ives to Padstow on the north. Last year they kept in deep water during the whole season, and the fishery was a failure. The council would remark that the migrations of this important fish appear to be sufficiently regular to indicate the periods when the fishery can be carried on with the greatest prospect of success, and with the smallest expense.

CONCHOLOGY.

The council have great pleasure in directing the attention of the society to a valuable donation of shells which has been made to our museum by the executors of the late Miss Lavars of this town. This collection has been examined by several eminent naturalists. It has been most liberally offered for our acceptance, in consequence of that lady having, at one time, expressed her intention of presenting them to our society. They are arranged and preserved in two elegant cabinets, both of which are now in our possession. The council have also the pleasure in saying that several donations have been received from Mr. Cocks of Falmouth. The council have no doubt that many of the specimens dredged within our own bay will find their way to our collection when proper accommodation can be offered.

STAR FISHES.

In this department of our labours we have hitherto recorded nothing; the council would remark, however, that it has not altogether been neglected. They have hitherto been silent on this subject, from a desire to render the list as perfect as their means would allow. A communication on the matter will however be laid before the society to-day from Mr. Cocks, who has also sent us a few specimens for our museum. The list given refers to the neighbourhood of Falmouth; but as most of those mentioned have also been found in Mount's Bay, it may be considered as indicative of the riches of our own district. Preserved specimens are quite ready for our museum.

ZOOPHYTES.

The researches among the *Zoophytes* have been rewarded with the discovery of a species new to our *Fauna*, and also with one entirely new to science, beside the acquisition of others exceedingly rare. The beauty and delicacy of these creatures are exceedingly great, and they would form a highly interesting addition to our collection. The council would again remark, that a series of specimens are quite ready for our acceptance, when we are in a position to receive them.

During the past year the dredge has been in constant operation, through the activity and zeal of a Lady, a friend to our society. The stores thus brought to light, together with those discovered by other members of our society, have been so great, that it has been proposed, that the more valuable productions thus obtained shall be brought under the notice of the society, immediately they occur, in a series of short papers, which may be called Miscellanea Zoologica: by so doing, we need not wait till we have collected a large quantity of materials on any one subject, or let any of our discoveries be unknown. The amount of information that will be thus acquired will be very great, and the course of a few years may be employed for important purposes.

It is impossible for us successfully to compete with the great collections of exotics found in the museums of large cities; but we

can collect in our own district, and render both our museum and reports valuable for the only things in reality of much worth, and for which hereafter they will be prized.

At present we require more room, and the council do not despair but that eventually they will be able to procure a museum worthy of our town, and worthy of that zeal which has already filled our present room to overflowing.

EDWARD HEARLE RODD,
J. N. R. MILLETT,
R. Q. COUCH,
} *Secretaries.*

Oct. 6th, 1849.

Remarks on the Luminosity of the Sea,

DELIVERED BEFORE THE SOCIETY AT ITS ANNUAL MEETING;

BY RICHARD Q. COUCH,

ONE OF THE SECRETARIES.

IN accordance with our annual custom of having an introductory address on some subject connected with our pursuits, I have again the pleasure of drawing attention to the philosophy of natural history; of showing that our studies are not exclusively directed to the mere collecting or preserving such things as may occur to us, but also to the higher objects of an intellectual comprehension of those wonders of creation with which we are surrounded. On this point we have laboured before, and it is with something like satisfaction that we can look on those signs of progress which are now before us. It is only five years ago, when our annual meetings were held in our own museum, and small as that room is, it was more than large enough to contain us: since that time our numbers have increased, and with the revival of our energies we have been obliged to leave our museum for the Town Council room: this in its turn has also become too small to accommodate us, and we are now driven to our present position; and I hope that ere long this too will be unable to contain us, and that a building will arise to supply our wants, which will be equally an ornament to the town and worthy of our pursuits.

Natural history, like every other branch of science, has made of late years rapid progress, and assumed a position in general

education to which in former years it never attempted to lay claim. This change has arisen from the spirit in which it has been pursued, and the higher aims which have directed the energies of our investigators. It cannot, indeed, be a matter of surprise, that so long as natural history meant only a mere collecting of plants and animals as objects of curiosity, that it should receive such little, or I may say no attention from the thinking portion of mankind. The contempt however which has almost universally been bestowed on the collector is very unmerited. A collector of natural history is a gatherer of facts, which though their value may not be at once apparent, yet the time may come when in other hands they may be turned to good account. What begins in curiosity, ends, very frequently, in an intense desire to investigate the subject thus accidentally brought to notice, and may lead eventually to important generalizations. The celebrated naturalist, Ellis, is an instance of this. He was a merchant of London, whom business or pleasure frequently took to our sea-shores. Like many other visitors to the coasts, he collected the sea-weeds which he found in his wanderings, and struck with their beauty, he fancifully arranged them into landscapes: so beautiful were these, that their fame even reached the ears of royalty, and he was requested to prepare some for the palace. While engaged in this, he observed that some specimens differed very considerably from others, both in their forms and delicacy of their tints. He examined them again and again, and found that their structure was even more beautiful and strange than their external forms. Feeling more interest in the subject than before, he took notes of every thing he observed; and from the dry specimens he turned to their natures as exhibited while alive. Then it was that the strange truth flashed across his mind, that though rooted and arborescent, these weeds were in reality of an animal character; a truth which subsequent researches have confirmed, and which has added an immortality to his name. Though we cannot hope to be equally fortunate in our pursuits, we may yet add considerably to the general stock of knowledge. It may not be the highest aim of pursuits perhaps, but the application of our investigations to economic purposes,—of our discoveries being made subservient to the conveniences of

life; and it is a subject well worthy of our attentive consideration.

We have on former occasions described the migrations of the pilchard, and referred to many of the causes which apparently influence their movements; there is one however which has hitherto been passed over in silence, and to this especial reference will now be made. It is an opinion long entertained by our fishermen, and therefore entitled to consideration, that what they call "briming," or "brimeing," is intimately connected with the migrations of the pilchard. By this term is meant the *luminosity of the sea.* This brilliant appearance of the ocean, at a time when all around is solitude, must at a very early period have attracted the attention of our navigators: it is a phenomenon, at once so brilliant and striking, that it must have excited in those ancient sailors the greatest wonder, and hence we find that many ingenious theories were erected to explain it, while the true study of the subject was entirely neglected. The theories thus formed were as evanescent as many of the meteor-like flashes they were designed to explain. Of late years, this, like every other branch of knowledge, has been pursued on the Baconian plan of induction, and though many erroneous views have been promulgated, yet the subject is much better understood than it could ever possibly be by following the old plans.

The luminosity of the sea has been witnessed in all quarters of the globe. It has been seen among the icebergs of the north, and has been traced from thence to the frozen regions of the south. It is seen in its greatest brilliancy within the tropics, gradually becoming fainter as it approaches the temperate and frigid zones. Its line of greatest intensity is about the equator, from whence it is gradually softened off into a glimmering halo towards the poles. It is observed in all parts of the ocean, but with greater frequency and brightness near the shores, and especially in bays and the deltas of rivers. It is seen at all depths, but is brightest near the surface. The light is not constant, nor is it always of equal intensity. During some nights, however much the waves may beat, it is scarcely apparent; while in others, it flickers at the slightest touch, and every breaker seems a sheet of floating fire. In some parts of the world the light is pale and

white, and gives the appearance of a sea of milk; on our own shores it is bright and glowing, and when seen in its perfection presents a prospect of extraordinary brilliancy and beauty.

It would not be in accordance with our design to refer to all the theories that have been formed, to afford us explanations of these phenomena; and it would be but a waste of time to attempt to refute such theories as have had even their foundations in fact. By some it has been supposed to be produced from the putrescence of the ocean, by the decomposition of fish, which may have diffused its properties through the surrounding water. But, how can it be explained by such views, that it should be more brilliant at one time than another, and that the shock of the water on the ship's sides should call up such brilliant scenes as are sometimes witnessed? It has not however been proved that the ocean is ever in a putrescent state; while it has been proved that all luminous fish lose their brilliancy the very instant decomposition begins. By some it has been supposed that the light of the sun which has been absorbed during the day is given out again during the night; but the cloudy and boisterous day is more congenial to the phenomena than the bright. These are merely theories, and are entirely unsupported by facts.

Whatever may be the result of observations made in other parts of the world, the luminosity of the sea, as exhibited in Mount's Bay, is the product of small animals extensively diffused through the waters. These creatures do not always yield their light; and indeed, taking it as a rule, they never do except under circumstances of excitement or irritation; and as soon as the causes have passed away the light again becomes dim and disappears. The proof of the vital and animal character of the phenomenon is easily tested. If a portion of phosphorescent water be taken up, and its temperature increased, specks of light are apparent in every part: if these be carefully taken up and placed under the microscope their nature is immediately detected; we not only discover that the light arises from a minute animal, but the part that gives it out is clearly exposed to view. If you place any of our *Crustacea* in cold water, and then place them over the fire, luminous specks make their appearance in all directions, and these

also on examination are found to be minute parasitic animals. The creatures having these luminous properties that have been examined on our own shores, are minute and undescribed *Crustacea*, gelatinous *Medusæ*, the *Pholas*, and several species of worms, all of which have been examined in a state of incandescence: these may be described at some future time.

The circumstances under which this luminosity is the most brilliant are the prevalence of south winds with misty and wet evenings. During the cold weather and northerly winds of winter it is rarely to be seen; and at these periods, if the water be examined, very few of these light-giving creatures can be detected.

It has been remarked that these creatures do not give out their light on all occasions, and this I think it is not very difficult to explain. It must be familiar to all who have been engaged in any of the fisheries that moonlight is almost destructive of success: the hake and cod-fish refuse the hook and the pilchard and herring avoid the net;—they sink into deep water; and so it is with these minute creatures to which we are now referring. The cold winds of the north and east are equally injurious; the fish retire to the bottom and refuse to eat. The explanation of this is difficult; for we can hardly suppose that the cold water of the surface sinking among the warmer strata below would produce such an effect, as before it sunk very deep the temperature would be equalized; such however is the fact. All the varieties we observe among the habits of the fish are as apparent among the other denizens of the deep.

Sometimes our waters are teeming with creatures, which at others are scarcely to be seen again for years. This was remarkably the case in 1845, when our seas were exceedingly brilliant for some months; but a gale occurring in June, the whole of the light disappeared. On examination, it was found that the minute oval *Medusa*, which had previously existed in millions, had entirely been destroyed. The *Medusæ* are very transitory in their existence, and from 1845 to the present day not a single specimen of the species then abounding has been discovered.

The temperature at which the light is emitted must of course vary much, as luminous creatures are observed in all latitudes;

but judging from observations made in our own district, it is chiefly developed at the autumnal or warmest parts of the year. Those species examined, and which have been detected in the act of giving out light, are not always luminous, and in a natural and unexcited state rarely are. The phenomenon is produced by concussion, or by any thing which produces excitement, and as soon as the cause ceases the light most commonly disappears. Though this is the case with the light-giving animals of the sea, yet it is not so with those of the land.

It has been asserted by a gentleman at the late meeting of the British Association, that the phosphorescence of the sea is entirely unconnected with vitality—that it has no intimate connexion with animal existences (by this it is presumed, that the old view of the putrescence of the sea is again advocated). To this we may reply, that all our observed facts go to contradict it. Having obtained some of the minute animals in the act of giving out their light, I placed them into filtered sea-water in which I could detect no phosphorescence, and in these unfavourable circumstances they again gave their light on agitating the glass. What it is that produces the light remains to be discovered. In many cases that have been examined, the light seems to depend on a thin fluid secreted by the animals. This in a natural state is not luminous; but if the animal from any shock becomes agitated, the secretion becomes increased, and acquires a brilliancy which it had not got before: this soon disappears, unless fresh secretions are again produced. The matter thus formed seems miscible with the water, and as it retains its brilliancy for a short time after it is removed, it may account for the sheet-like expansion it sometimes rapidly assumes, and which can hardly be accounted for in any other way. It would not advance the investigation of our subject to advocate any theory as to the abstract causes of its production; we have in this stage of our pursuits to deal entirely with facts: nor need we inquire into the uses to which such lights can be made subservient. Knowing the general harmony of Nature, and the exquisite economy with which she regulates her resources, we may rest satisfied that in this instance no order is violated, and that these strange phenomena are subservient to important purposes.

M'Cullock has fancifully supposed, that as in the ocean there is absolute darkness at the depth of 800 or 1,000 feet, the luminousness may be a substitute for the light of the sun, and may be the means whereby these creatures are enabled to discover one another.

The luminosity is first apparent soon after sun-set, and it continues throughout the night; hence, if any fish are moving rapidly through the water, these creatures, the instant they are touched become luminous. The fishermen, knowing this, will wait the briming time, to discover what possibly may have escaped their observation during the day.

It must have been observed by many among us, that the whiting and other fish become luminous after death; in the whiting very soon after, and in others after a longer or shorter period: in all, however, it ceases before the putrefactive process has set in. Those that putrefy the quickest yield their light the quickest. In such cases, the brightness resides in a mucous kind of fluid, which soon loses its properties after it is separated from the fish. So it is with the phosphorescence of living animals; the substance in which the light resides is miscible with the water, but loses its properties very soon after, and I believe never again recovers it.

We have seen that after death some fish emit light immediately before the putrefactive process commences; but this is the case also with some of the horny corallines of our coasts. It has been asserted that among the corallines it is a vital process, but in this I cannot at present agree. I have examined all kinds of corallines, under a great variety of circumstances; I have tested them in a variety of ways, as they have been growing on the rocks and sea-weed; and though I have occasionally seen a spark now and then under such circumstances, yet I have found at the same time a few parasitic insects on them, which I have afterwards found to be phosphorescent. If, however, these corallines be removed from their attachments, and placed in a box, they themselves become luminous; whether in the act of dying, or immediately before decomposition sets in, I have been unable to decide.

Mr. W. Thomson has seen a few sea-weeds (*Chondrus crispus*, *Pystocera ericoides*, &c.) become luminous in a growing state. Most, if not all, the *Sertulariæ*, or horny corallines, give out this

light: I have seen it in all I have examined under favourable circumstances. Mr. Hassall has seen it in the sea-threads, and other transparent species. He says, "I lately had an opportunity of beholding this novel and interesting sight of the phosphorescence of *Zoophytes* to great advantage, when on board one of the Devonshire trawling boats which frequent this coast. The trawl was raised at midnight, and great quantities of corallines were entangled in the meshes of the net-work, all shining like myriads of the brightest diamonds." And the Rev. David Landsborough has made similar remarks:—"Every cell becomes a star, and as each polype had a will of its own, they lighted and extinguished their little lamps, not simultaneously, but with rapid irregularity." The province of *Zoology* thus offers many interesting problems for solution. It is difficult to form any adequate idea of the vast assemblage of facts or the strange phenomena that are offered for our study and elucidation. To detect and describe the peculiarities of creatures which all can observe may be interesting and instructive; but to investigate such strange phenomena as are witnessed in the luminosity of the sea, and to find that they are produced by living organisms, we are lost in astonishment, and turn with something like awe to contemplate the habits and histories of such wonder-working creatures. To examine the forms and peculiarities of the creatures around us constitutes but a small portion of pursuits: their histories and habits, together with the parts they play in the economy of creation, are legitimate subjects for our attention, and as such, we venture on the subject. In this, we can be greatly assisted by such members of our society as take pleasure in yachting. At times when the luminosity is more than usually brilliant a bottle of the water can very readily be brought on shore, and this is all that is required. It is a subject which has been much neglected.

Every observer has his own field for research, a subject of his own choice, and he chooses best whose labours entertain his vacant fancies most. But we must endeavour to bring up every branch to an equal footing. However brilliant our birds, our insects, or our flowers may be, it should always be remembered, that though some branches may be less obtrusive on public atten-

tion than others, yet that the most obscure are replete with interest and fine philosophy, and that every locality, from the bare rock on the heath, or the swampy bog, to the most highly-favoured spot, abounds with productions which are peculiar to it, and conveys instruction which is nowhere to be found beside. This is one of the grand recommendations of our pursuits. We are never at a loss for subjects,—subjects which are governed by unerring laws, directed by unerring wisdom, destined to some great end, and which harmonize with every other thing about us. The advantages attached to the pursuit of natural history have never yet been fully appreciated. All is perfect and beautiful; possessing not only a present interest, by its association with other branches of science, but linking us to the past histories of our globe, and carrying us, at least in imagination, into the future.

This subject demands our attention, and favourably situated as we are for the investigation, it is to be hoped that the members of this society will not suffer it again to drop into neglect.

Addition of a new Fish to the Cornish Fauna.

By JONATHAN COUCH, Esq., F.L.S., &c.,

MEMBER OF THE SOCIETY.

IT is only of late that more than one species of *Atherine* has been recognized by naturalists; and even in the last edition of Mr. Yarrell's "British Fishes," no other besides the *Atherina presbyter*, popularly known in the West of England as the common smelt, is recorded a British species. It is with much pleasure, therefore, that I am able to communicate to the society the fact of the occurrence of another species,—the *A. Boyeri* (Boyer's *Atherine*, of Risso and Cuvier), on our coast; and as the circumstances attending its discovery appear to me to be illustrative of its distinguishing habits, I will be the more particular in describing the circumstances under which this fish fell under my observation.

In the middle of October, 1846, when the weather was turbulent and the sea much disturbed, a multitude of little fishes made their appearance in our harbour, and when the water became smooth they were seen to be loosely scattered all over the space, not more than two or three being near each other, none of them far below the surface, all busily engaged in touching or taking minute objects swimming at the surface; so that it appeared as if there was perpetually falling a thinly-scattered succession of drops of rain. As these fishes continued with us for more than a week, I had several opportunities of watching their actions; and I observed that they often associated into small loosely-arranged companies, but the whole multitude commonly proceeded in one direction, examining every small attractive object on the surface that had a little motion; and dimpling the surface in doing it. But when I proceeded to endeavour to obtain a few for examination, I soon discovered that however earnestly intent they appeared

to be on the objects of their pursuit, they were not less attentive to keep themselves out of the way of harm. With a hook I had little success, as from their small size, none but those which are used in flyfishing could be taken by them; but they showed much indifference to a bait, and only followed it when by a little motion it was made to assume the appearance of life. Their vigilance I was made more sensible of when I attempted to catch a few with a hand-net from the rock; for they always kept at a distance from the place where I fixed myself, and thereby rendered it exceedingly difficult to secure a single one. I succeeded at last, only by concealing myself behind a projecting ledge, and making a sudden dip with the net in a direction opposed to their course.

These fishes were all of one size, about three inches long, and much resembling the common *Atherine;* but they are distinguished by a proportionably larger eye, and a somewhat different arrangement of the fins. They are well described and figured in the History of Fishes by Cuvier and Valenciennes, for access to which I am indebted to my friend Mr. Yarrell, to whom I had the pleasure of presenting the specimens I obtained. It appears that they are not uncommon in the Mediterranean.

POLPERRO.

Remarks on early British Residences, and on the remains of an Ancient Village, near Chûn Castle.

By MISS MATILDA MILLETT,

MEMBER OF THE SOCIETY.

THROUGH the kindness of an active member of many of the scientific societies in London, I have lately embraced an opportunity of perusing several Papers, read before the British Archæological Association, the Ethnological Society of London, and others, on the aboriginal tribes of Britain, and the remains of their locations, found during the last few years in several parts of the kingdom. The knowledge that the district of West Penwith gives place to no other in objects of antiquarian interest, induced me to suppose it not less deficient in remains of the residences of our rude ancestors than Yorkshire, Dorset, or indeed any other county. Observation and inquiry have led to the conclusion that many interesting localities exist which have not been noticed as they deserve; I therefore venture to bring the subject before you, though I cannot forbear expressing my regret that it has not fallen into abler hands.

Writers of all periods agree in describing the habitations of the Ancient Britons to have been "little round hovels, formed of poles united to a point at the top and covered with reeds or straw, placed upon low circular walls or banks of rough stones or earth."*

The accompanying Sketch or Plan of the ancient village I am about to describe, my sister and self have been at some pains to make, as correct as the nature of the ground and intricacy of the remains will allow.

* King's "Munimento Antiquæ," vol. 1.

On a rising ground, on the eastern side of the foot of the hill on which Chûn Castle stands, and possessing little to attract notice, unless closely observed, may be traced the ruins of upwards of thirty enclosures, of a rude circular form, varying from 8 to 40 feet in diameter; some of the larger ones appear to have been originally divided and subdivided: the walls or hedges are composed of unhewn stones without cement, and vary in elevation from 5 feet to mere foundations. Not a vestige of iron, or metal of any kind, is to be found, nor the mark of any tool: there are no windows nor chimnies, and the entrances, where most perfect, are very narrow, averaging but two feet and a half.

It being desirable to discover, if possible, the fire-places, or some relics of the beings who called this place their home, the consent of Mr. Hichens, the leaseholder of the part of Bossullow in which this village is situated, was obtained; and the labourer employed, having removed earth and stones to the depth of a foot below the surface from the centre of the hut marked 1 on the plan, laid open a thin layer of unctuous black mould, in which was a small quantity of charred wood, a great number of burnt stones, and as many fragments of pottery as filled a small basin: a portion of the latter, as well as some of the charcoal, my sister and self have much pleasure in presenting to the society. Amongst the pottery found in this hut, are parts of the upper edges or rims of seven different vessels. The seam of black earth was from 2 to 3 inches above the undisturbed clay, or what the miners here term *the fast*. On examining the adjoining hut, marked 2 on the plan, nothing worthy of remark was presented, except that at a foot below the surface some flat stones appeared to have been placed on the clay, forming a sort of rude pavement. The pottery may be useful in determining the period when these long desolate and humble dwellings were inhabited; and I presume the circumstance of their elevation being greater than of many found in other counties, will not take from their antiquity, situated as they are in a most stony part of this most stony county. About six years ago, great quantities of fragmental pottery were found in an adjoining enclosure, and a field, separated by a lane only from these huts, is called the "Barrow field."

"In the year 1754, in a barrow or heap of stones at a place called Carne, was discovered an ancient urn."* Mr. Hichens, who is also the proprietor of Carne estate, informs me, that so late as three years ago his labourers found there "strange coarse pottery and curiously polished stones;" unfortunately none of these have been preserved. It appears somewhat singular that this village is unnoticed by Borlase.

In Gilbert's "Cornwall," p. 195, and Britton's "England and Wales," pp. 500–501, the following paragraph occurs:—"On the north side of Chûn castle is a passage or road, partly excavated out of the soil, and fenced in by high stones on each side. This communicates with the fortified retreat and the ruined buildings of a village or town, which occupy the north fence of a neighbouring hill, and consist of numerous foundations of circular huts. These are from 10 to 20 feet in diameter, with a narrow entrance between two upright stones, but without a chimney, and the walls are formed of stones of various sizes rudely piled together without mortar." These gentlemen have erred as to the position of the huts, and the walls can scarcely be said to be of "stones rudely piled together," seeing they display some skill in hedging, and in several places are little inferior in construction to those of Chûn castle.

Davies Gilbert, vol. 3, p. 244, in his "Parochial History of Cornwall," referring to Chûn castle, says,—"near it appear the simple remains of an ancient town."

My limited opportunities of research afford no further notices of these interesting remains. It may not however be out of place to remark, that they are known amongst the country people as the "huts of the old people;" and, from appearances in the neighbouring crofts, it is pretty certain that the "old people" must have been particularly numerous in this locality.

The question of the date of Chûn castle will I believe soon be brought under the notice of the Archæological Society, by a gentleman who has devoted much time to similar objects; and this village, being within a quarter of a mile of it, cannot I think

* Drew's Cornwall, p. 497.

be overlooked: he will exhibit a model of the castle, and is in possession of a copy of the accompanying plan.*

I have reason to believe that many remains of huts, of an earlier period than those described, may be found on our hills, and on Carn Kenijack in particular, notwithstanding the opinion of the late Rev. Mr. Buller to the contrary, so nearly do the small circular enclosures there correspond with those described by Mr. Saull, Dr. Young, Rev. C. Warne, and other antiquarians. See "Transactions of the British Archæological Association, at its 3rd congress." (1846.)—"Notilia Britannæ," by W. D. Saull, F.S.A.

If these few and imperfect remarks serve to stimulate any member of the society to investigate this almost untrodden path of antiquarian research, my object will be attained. Surely the homes of our rude ancestors claim some little attention, when so much has been bestowed on their burial places.

Penzance, March 31st, 1849.

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* This Plan is deposited in the society's museum, and may be inspected by any person, on the recommendation of a member.

Notice of the Capture of an immature Woodchat Shrike at Scilly.

By EDWARD HEARLE RODD, Esq.,

one of the secretaries.

In the secretaries' report reference is made to the importance of watching, with peculiar care, the migratorial movements of birds, at the proper seasons, in this district, which, from its maritime and extreme westerly position, has proved hitherto so valuable for the advancement of ornithological science. Every dispatch from Scilly, since the drawing up of the secretaries' report, has brought over some additional examples of migratory birds more or less rare. But nothing has been received of so especial a value as to deserve a particular notice until yesterday, when Mr. Smith forwarded a bird which has only once before authentically been noticed in Cornwall, and that occurred also in the same district as the present specimen. The bird referred to is the woodchat shrike (*Lanius rufas*).

The first notice of the capture of this bird has been recorded in one of the early reports of the society, and reference was then made to the claims it had to be enlisted with British birds having been so doubtful, as to have induced Bewick, Selby, and I believe some other celebrated ornithologists, not to include it in their catalogues. In the later editions of their works they have however given a figure and description of it. The present example is apparently a young bird of the year, and it may be recognized from the young of its congener *Lanius collurio* from an indistinct development of certain characters in the plumage of the former which are not observed in the latter, especially the

white scapulary feathers and the white basal halves of the quill feathers. The former specimen was an adult bird, and the figure of the bird in Gould's "Birds of Europe," now lying on the table, perfectly corresponds with this specimen. That now exhibited is not only interesting as the same rare species in a different state of plumage, but also as affording every reason to believe that it was bred in Britain,—no instance of its being bred in this country having been hitherto recorded by any naturalist.

Penzance, Oct. 6th, 1849.

List of Echinodermata, *procured in Falmouth and neighbourhood from* 1843 *to* 1849.

By W. P. COCKS, Esq.

Arrangement and Nomenclature of Professor Forbes.

CRINOIDEÆ.

Comatula rosacea . . . . From crab-pots, roots of the *Laminaria digitata, bulbosa, saccharina,* &c.; deep water; extreme low-water mark; not uncommon.

OPHIURIDÆ — OPHIURÆ.

Ophiura texturata . . . . . Deep water, trawl refuse; frequent.

——— *albida* . . . . . Deep water, trawl refuse; attached to the roots of the *Antennularia, Antennina,* and *Sertularia nigra,* &c.; frequent.

Ophiocoma neglecta . . . Under stones, l. w. mark; common.

——— *Ballii* . . . . . Under stones and attached to the roots of *Algæ;* low-water mark, spring tide, Gwyllyn-vase, S.W.; rare.

——— *filiformis* . . . Dredged in the harbour; trawl refuse; stomach of haddock; between the folds of the *Eschara foliacea,* &c.; rare.

——— *brachiata* . . . Found between the folds of the *Eschara foliacea;* dead valves of the *Pinna ingens;* stomach of piper; harbour, deep water, and trawl refuse; rare.

——— *granulata* . . . Deep water; trawl refuse; not uncommon.

——— *bellis* . . . . . Deep water; trawl refuse, &c.; not common.

——— *rosula* . . . . . Under stones, &c.; common.

——— *minuta* . . . . Under stones in sandy situations; Swanpool, Gwyllyn-vase, &c.; scarce.

ASTERIADÆ — URASTERIÆ.

Uraster glacialis ..... In pools on rocks, low-water mark; trawl refuse, &c.; common.
——— *rubens* ..... In pools, rare; deep water, common.
——— *violacea* ..... Trawl refuse; rare.
——— *hispida* ..... Trawl refuse; very rare.

SOLASTERIÆ.

Cribella oculata ..... Trawl refuse; not uncommon.
——— *rosea* ..... Trawl refuse; not uncommon.
Solaster endeca ..... Trawl refuse; scarce.
——— *papposa* ..... Trawl refuse; common.

GONIASTERIÆ.

Palmipes membranaceus. Trawl refuse; common.
Asterina gibbosa ..... In pools; very common.
Goniaster Templetoni... Trawl refuse; rare.
——— *equestris* ..... Trawl refuse; not uncommon.
——— var. . Trawl refuse; not uncommon.

ASTERIÆ.

Asterias aurantiaca .... Trawl refuse; common.
Luidia fragillisima .... Trawl refuse; common: every specimen mutilated.

ECHINIDÆ — CIDARITES.

Echinus sphœra ..... Trawl refuse; common: young specimen found attached to stones, low-water mark.
——— *miliaris* ..... Harbour, trawl refuse, and low-water mark; not uncommon.
——— *Flemingii* ..... Trawl refuse; common.
——— *lividus* ..... Harbour; trawl refuse; not common.
——— *neglectus* ..... Trawl refuse; rare.

CLYPEASTERIÆ.

Echinocyamus pusillus .. Shell-sand; Gwyllyn-vase, bay, Bar-point, &c.; not uncommon.

SPATANGACEÆ.

Spatangus purpureus ... Trawl refuse; not uncommon.
Amphidotus cordatus ... Trawl refuse; not uncommon.

HOLOTHURIADÆ or CIRRHO-VERMIGRADE ECHINODERMATA.

PSOLIDÆ.

Psolus phantapus..... Trawl refuse; not uncommon.
——— *tenama*? (20 tentacula) trawl refuse; not uncommon.

PENTACTÆ.

Cucumaria pentactes ... Harbour; trawl refuse; between rocks, low-water mark; common.
——— *communis*... Ditto ditto ditto.
——— *fusiformis* .. Ditto ditto rare.
——— *Montagui* .. Ditto ditto not uncommon.
Ocnus brunneus..... Trawl refuse; two from the stomach of the *Psolus tenema*; not uncommon.

THYONES.

Thyone papillosa ..... Trawl refuse; rare.

SYNAPTÆ.

Chirodota digitata ..... Glasson's beach, rare; Helford river, common.

SIPUNCULIDÆ or VERMIGRADE ECHINODERMATA.

SIPUNCULACEÆ.

Syrinx nudus ..... Trawl refuse; low-water mark; Helford; common.
——— *papillosus* ..... Glasson's beach, rare; Helford, common.
——— *Harveii* ..... Bar, rare; Helford, scarce.
Sipunculus Bernhardus. Trawl refuse; Gwyllyn-vase, Bar, and Helford river.
——— *Johnstoni* ... Roots of coralline, &c.; Gwyllyn-vase, Swanpool, &c.
——————— var. Ditto ditto.
Thalassema Neptuni ... Gwyllyn-vase; Swanpool; common.
Echiurus vulgaris..... Gwyllyn-vase, east; rare.

Falmouth, June, 1849.

On the Physiological developement of Cells among the crustaceous Zoophytes.

By RICHARD Q. COUCH, M.R.C.S.,

ONE OF THE SECRETARIES.

IN a Paper, which I had the pleasure of reading to the society at its last annual meeting, I explained the opinions I entertain on the character of the solid parts of our *Asteroid Zoophytes*. As these views were opposed to those expressed by some of our best cultivators of this branch of science, I gave the grounds on which I based my conclusions. On the present occasion, I wish to draw attention to the same subject, as exhibited in one section of the *Ascidian Zoophytes*. At a future time the same investigation may be carried through each genus of this extensive class. In the present Paper I shall confine my remarks almost exclusively to *Membranipora pilosa* and *M. membranacea*.

The *M. membranacea* is a common species, and during the summer it may be found spreading its gauze-like expansions over all the large sea-weeds of our bay. In examining the organic character of its solid parts, I will select a specimen already perfect, but which is enlarging itself by subsequent growth. The first process in the growth of all the encrusting species of this class is an effusion of a transparent fluid matter, which extends beyond the borders of the secreting mass, but differently in different species. In *M. membranacea*, it occurs most abundantly in a longitudinal direction, and much less so laterally. This effusion takes place periodically, and marks the extent of each period of growth. The matter, at first fluid, soon becomes more solid, probably from exposure, as well as from vitality. In a few days, from its secretion, faint albuminous looking streaks are observed traversing it in a longitudinal direction. These lines are continuous with the

sides of the cells, and extend at last to the boundaries of the growth. At first they are ill defined and milky, but rapidly become defined and calcareous. As soon as they approach to distinctness of form, a faint opaque transverse line is observable at intervals, and those of one line alternate with those of the spaces on either side. These transverse bars are stouter than the longitudinal ones, and, at the corners, get enlarged and hollow, but subsequently become quite opaque and apparently solid. The line of growth of this species is almost entirely longitudinal, and its extent is bounded only by the size of the substance on which it grows. There is but a slight lateral growth, and hence the polypidoms are generally long and narrow, but the breadth is frequently, or rather always, dependent for a portion of its extent on the manner in which the cells are formed.

The cells are arranged longitudinally in lines, and gradually increase in breadth, till at last two smaller ones are formed on the extremity of a larger one; these increase in size as before, and again form duplicates at about the eighth or tenth distant. If fifty or sixty rows thus go on increasing, a series of internal wedges are formed, which thrust the external lines into slightly arched forms. This again in its turn is another source of the lateral growth; for as the axis of growth is altogether in the longitudinal direction of the cells, this arching gives a greater truncated or terminal surface, and a tendency to a still further increase by the effusion extending slightly laterally beyond the terminal cells.

The axis of growth is therefore longitudinal; but there are circumstances which modify this. If the organizable matter is obstructed in its expansion by an elevation, or a hole in the fucus, it surrounds this part, and the cells are formed circularly round it. But I find, from experiment that the line of growth can be altogether reversed, and the longitudinal direction of the cells is also reversed in such a case. In a specimen where the effusion was very perfect, I separated a portion from all its attachments, except at its distal extremity. The growth in the usual direction went on as before, but the isolated parts showed no signs of vitality. When the normal portions had become developed, faint lines were observed traversing the isolated portion, and the growth went on

as before. The cells were formed from the point of attachment, and in the opposite direction from the normal state. In another specimen the proximal and distal portions were removed, and a patch left standing at right angles to the central portions, and the developement of cells took place at right angles to the usual course. From these remarks it seems that the axis af growth in a normal state is in the direction of the long diameter of the cell alone; but that if this be interrupted, it takes the direction of the attachment, wherever it may be. In such cases the cells are generally smaller than those developed in the usual way.

The fluid as at first developed is transparent, and without any anatomical distinction of parts. As developement advances, a general cloudiness occurs, the division of cells appear, and with this an obscure organization is observed in the spaces formed by the cells; this is the first stage of the polype developement. As the cells become more and more perfect, the polype also advances to maturity. It has been advanced by Milne Edwards and others, that the polypidom is formed by the polypes, but a minute examination of the whole process will show that this is not strictly true, but that the polype is formed in the organizable matter, and advances to maturity in equal ratios with the other portions of the polype mass. The effused fluid is effected by the whole polypidom, and not by the polype, and in fact the polype does not hold physiologically the pre-eminent position in the economy of the whole creature which some authorities maintain.

In *M. pilosa,* the form and distribution of the cells differ from those of the species just described. The first process, or the effusion of an organizable matter, is the same in both; but the formation of cells takes place in two modes; the *lateral* and *terminal.*

First, the lateral. The effusion of the organizable matter, and all the process of the earlier stages, are alike in both. At first the effusion is so transparent, that it can be detected only on close inspection, but in a short time it assumes a hazy opacity. After this, a faint milky line is seen extending from the base of each cell in a curved direction, in the axis of growth, till it meets with a similar line above; these uniting, form the boundaries of a polype cell. The cell being now formed in outline, the next process is the

developement of the specific markings. The inferior, or proximal and intercellular portions become more and more distinctly formed and condensed or organized. On the inferior rim a tubercle is produced, at first hollow, with a calcareous rim and long slender bristle. These parts become rapidly solidified, and the marginal denticles follow one after the other, till the perfect cell is produced; but the cells are formed in such rapid succession, that two or three rows are undergoing the same process at one time, and hence may be observed in a variety of stages at the same instant. Before the opaque outline of the cell is complete, the rudimentary state of the polype is observable in the centre or rather at the central part of the base of each cell.

Second, the terminal. By the terminal formation, is meant the apposition of the cells end to end, so as to make the polype mass increase longitudinally. In this a different order of progress is observed from that just described. The organizable lymph is thrown out, as before mentioned, and then, in continuation of the parieties of the old cells, faint milky lines are observable. These lines, from being merely milky, become more and more opaque and calcareous. When the length of a cell has been effected, a light transverse bar is observed to pass across the space, between the two parallel lines. In this state the cells are quadrangular, and so far from being characteristic of the species, more nearly resemble those of the *Flustra membranacea*, and afterwards *F. chartacea*. The transverse bar is straight, but as organization advances it contracts, and draws the lateral lines into an arched or oval form, from the contraction being at each end. In this early state the transverse bar seems double, and has a spine which disappears subsequently, and from this the long bristle arises. Condensation, or, more properly speaking, developement, goes on; the lateral as well as the transverse lines shorten, and become moulded into the oval, belonging to the species; and during this process the marginal denticles are formed.

The increase is more extensive in the terminal than in the lateral mode of formation; for while in the former thirty or forty rows of cells may be observed in different stages, at one time, yet in the latter it rarely amounts to more than three or four, and sometimes

not more than one: the polypes, in either case, appear before the cells are fully formed. The general form of growth is just as now described, but it is liable to variations, according to the nature of the substance on which the mass rests. In whatever way the variations may occur, the linear and alternate characters of the arrangement of the cells are observed. I have seen several cases in which the pulp effused has been deficient for the complete formation of a cell; in such instances an alteration in the diameter of the part has been effected; and in some cases the growth has been retrograde, so far as the general direction has been concerned, but in a direct line, so far as the attachment of the anormal growth was concerned.

The growth of the cells in *Flustra*, *Lepralia*, *Membranipora*, and *Cellepora* takes place in precisely the same manner, being modified in developement only by specific characteristics. In the encrusting species of *Cellepora*, when a layer of cells is first formed, each cell exhibits its specific markings very distinctly, but afterwards these distinctions become very importantly modified; the rims of the apertures change in shape, become smaller, and sometimes split; the irregularities of the surface become filled by calcareous deposit, and the furrows marking the separation of the cells obliterated. In such a case it is not easy at all times to distinguish between closely allied species. When all the markings have become obliterated, and in some cases when the apertures have been filled up, a layer of organizable lymph is effused over and around the solid mass, and in this cells are developed as perfectly as in the first layers. It is this upward accumulation of cells that give the peculiar form to some of the species, such as *C. pumicosa:* in such cases, the terminal and lateral expansions are small. In some species one form of growth predominates, while in another it is altogether different; but in every case the cells are formed in a plastic fluid previously effused. This fluid is the first stage in the developement of every part. The calcareous growth of the cell and the developement of the polype occur simultaneously, from a *specific* vitality resident in the pulp, varying in each kind. The vitality of the pulp is preserved by its connexion with the polype mass; but if in a new part a perfect polype

has been produced, that part may be separated from the parent source without destroying its vitality, but not else; it has no independent vitality till a portion has been perfected. From this, an explanation may be drawn, why we frequently observe, that while one part is in luxuriant life another is in rapid decay; and how it is, that one set of polypes will erect their habitations on the decayed homes of their ancestors. I have not yet been able to ensure the continuance of vitality in the parts so recently effused that the cellular structure had been imperfectly formed; but if a polype has been produced, it is not difficult to do so.

There can be no doubt as to the calcareous parts being endowed with vitality; this I believe is not now denied, even by those who decline to believe it existent in the *Sertularian Zoophytes.*

List of Marine Algæ, *found on the Falmouth shores previous to September*, 1849.

By MISS WARREN.

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g. Occurring in a growing state. *c.* Cast on the shore. *h.* Falmouth harbour. *b.* Falmouth bay.

All may be considered of general, or frequent occurrence, if not otherwise mentioned; and "Harvey's Manual" will give the particulars of the stations, with respect to their being between tide marks, or beyond, in which the plants delight to grow.

Series 1.—MELANOSPERMEÆ.

Fam. 1.—Fuceæ.

g. Cystoseira ericoides. Ag.
g. ——— granulata. „
g. ——— fibrosa. „
} *b.*

c. Halydrys siliquosa. Lyngb. *h.* & *b.*

g. Fucus vesiculosus. L.
g. ——— ceranoides.* „
g. ——— serratus. „
g. ——— nodosus. „
g. ——— canaliculatus. „
} *h.* & *b.*

g. Himanthalia lorea. Lyngb. *h* & *b.*

g. Lichina pygmæa. Ag.
g. ——— confinis. „
} *b.*

* More local and far less abundant than the other species.

Fam. 2.—Laminarieæ.

g. Laminaria digitata. Lamour.
g. ——— bulbosa. „
g. ——— saccharina. „
} *h.* & *b.*

Fam. 3.—Sporochnoideæ.

c. Desmarestia ligulata. Lamour. *b.* Not frequently.
c. ——— viridis. „
c. ——— aculeata. „
} *h.* & *b.*

c. Sporochnus pedunculatus. Ag. *b.* Very rarely.

Series 1 (*Melanospermeæ*), continued.

Fam. 4.—Dictyotiæ.

c. Cutleria multifida. Grev. *b.* Very rare.
c. Dictyota dichotoma. Lamour.
c. ——— ——— *b intricata.* Grev. } *h.* & *b.*
c. Stilophora rhizodes. J. Ag.
c. Dictyosiphon fœniculaceus. Grev. *b.* Very rarely.
c. Punctaria latifolia. „ *h.* & *b.* Not frequently.
g. ——— plantaginea. „ *b.*
c. Asperococcus compressus. „ *h.* & *b.* Very rarely.
c. ——— Turneri. Hook. *h.* Occasionally in plenty, though considered a rare plant.
g. ——— echinatus. Grev. *h.* & *b.*
g. Chlorosiphon pusillus. Harv.
g. Chorda filum. Lamour. } *h.* & *b.*
g. ——— lomentaria. Grev.

Fam. 5.—Ectocarpeæ.

g. Cladostephus verticillatus. Lyngb. } *h.* & *b.*
g. ——— spongiosus. Ag. }
g. Sphacelaria scoparia. Lyngb. *b.*
g. ——— cirrhosa. Ag. *h.* & *b.*
c. ——— ——— *b. ægagraphila.* Grev. *b.*
c. ——— ——— *var.*, by Mrs. G. and Miss C. Harvey. *b.*
g. Ectocarpus littoralis. Lyngb. *h.* & *b.*
g. ——— siliculosus. „
g. ——— tomentosus. „
g. ——— granulosus. Ag. } *b.*
g. ——— brachiatus. Harv.
g. Myriotrichia clavæformis. „
g. ——— filiformis. „

Fam. 6.—Chordarieæ.

g. Elachistea fucicola. Fr.
g. ——— flaccida. „ } *h.* & *b.*
g. ——— scutulata. „
g. Leathesia tuberiformis. Grev.
c. Mesogloia vermicularis.* Ag.
c. ——— virescens.† Carm. } *b.*
c. ——— Griffithsiana. Grev.
g. Chordaria flagilliformis. Ag.

* Not unfrequently. † Less frequent than *

Series 2.—RHODOSPERMEÆ.

Fam. 7.—Ceramieæ.

g. Callithamnion plumula. Lyngb. *b.* Not of very frequent occurrence.
c. ——— ——— *b. small.* Harv. *h.* & *b.*

Series 2 (*Rhodospermeæ*), Fam. 7 (*Ceramieæ*), continued.

g. Callithamnion Turneri. Ag. ⎫
g. ——— ——— *b. repens.* „ ⎬ *b.*
g. ——— Brodiæi.* Harv. ⎪
g. ——— tetragonum.* Ag. ⎭
c. ——— tetricum.* Ag. *h.*
g. ——— brachiatum. Harv. *b.*
c. ——— Hookeri. Ag. ⎫
c. ——— roseum „ ⎬ *h.* & *b.*
c. ——— byssoideum. Arn. ⎭
g. ——— Borreri. Ag. Flushing quay.
g. ——— gracillimum.* Ag. ⎫ *b.*
g. ——— thuyoideum.* „ ⎭
c. ——— corymbosum. „ *h.* & *b.*
g. ——— pedicellatum.* „ ⎫ *b.*
g, ——— floridulum.* „ ⎭
g. ——— Rothii. Lyngb. Flushing quay.
g. ——— Daviesii. Ag. *h.* & *b.*
g. Wrangelia multifida. J. Ag. *b.* Not frequent.
g. Griffithsia corallina. Ag. *h.* & *b.* In plenty, though considered a rare plant.
g. ——— setacea. „ *b.* But rarely met with.
c. ——— equisetifolia. Ag. In small bits only; very rare.
g. Ceramiun ciliatum. Ducluz. ⎫ *b.*
g. ——— echionotœum. J. Ag. ⎭
g. ——— nodosum. Grev. and Harv. *h.* & *b.*
g. ——— diaphanum. Ag. *b.*
g. ——— rubrum. „ *h.* & *b.*
c. Microcladia glandulosa.† Grev. ⎫ *b.*
g. Ptilota sericea. Harv. ⎭

* Not of very frequent occurrence.

Fam. 8.—Gloiocladeæ.

c. Dudresnia coccinea.* Bon. *h.*
g. ——— divaricata.† J. Ag. ⎫
g. Nemalion multifidum. „ ⎬ *b.*
g. Gloiosophonia capillarus.† Carm. ⎭

* Local, but at times plentiful, though considered a *very rare* plant.
† Occasionally met with.

Fam. 9.—Nemastomeæ.

c. Iridæa edulis. Bory. *h.* & *b.*

Fam. 10.—Spongiocarpeæ.

g. Polyides rotundus. Grev. ⎫ *b.*
g. Furcellaria fastigiata. „ ⎭
c. Gymnogongrus plicatus. Mart. *h.* & *b.*
g. Chondrus crispus. Lyngb. *h.* & *b.* Plentiful in many varieties.
g. ——— Norvegicus. Lamour. *b.* Local, but rarely met with.
g. Phyllophora membranifolia. J. Ag. *b.*

Series 2 (*Rhodospermeæ*), continued.

Fam. 11.—Gastrocarpeæ.

g. Kallymenia Dubyi.* Harv.
g. Dumontia filiformis. Grev.
g. ——— ——— *b. crispata.* Harv. } *h.* & *b.*

* Plentiful in the harbour, but rare in the bay. This plant was first found by Miss Warren in March, 1844 (if not as early as 1839), and recognized by Dr. Harvey in 1847, as a native of the coast of Normandy, not previously known as a British plant. The first fruited specimens were obtained by Miss W. in Aug., 1848.

Fam. 12.—Coccocarpeæ.

g. Gigartina mamillosa. J. Ag. *b.*
Gelidium corneum. Lamour.
g. ——— ——— *var. latifolium.* Harv. } *h.* & *b.*
g. ——— ——— *var. confertum.* „ }

Fam. 13.—Sphœroccoideæ.

g. Hypnea purpurascens. Harv.
g. Gracilaria confervoides.* Grev.
c. Sphœrococcus corinopifolius.† Ag.
g. Rhodymenia bifida.‡ Grev.
g. ——— ——— *var. ciliata.*‡ Harv. } *b.*
g. ——— laciniata. Grev.
c. ——— membranifolia.† J. Ag.
g. ——— palmata. Grev. *h.* & *b.*
g. ——— Palmetta. „ *b.* Not frequent.

* Local, but plentiful. † Occasionally a single specimen or two. ‡ Local.

Fam. 14.—Delesseriæ.

g. Plocamium coccineum. Lyngb.
c. Delesseria sanguinea. Lamour.
c. ——— sinuosa. „ } *b.*
c. ——— alata. „ } *h.* & *b.*
g. ——— hypoglossum.* „ }
g. ——— ruscifolium.† „
c. Nitophyllum Gmellini.‡ Grev. } *b.*
c. ——— laceratum.‖ „
c. ——— Bonnemaisonia.‡ Grev. *h.*

* At times cast up in the harbour abundantly.
† Local, but often plentiful, though considered a rare plant.
‡ Very rarely. ‖ Sparingly.

Fam. 15.—Chondarieæ.

c. Bonnemaisonia asparagoides.* Ag.
g. Laurencia pinnatifida. Lamour.
g. ——— ——— *b. angustata.* Harv. } *b.*
g. ——— tenuissima. Hook.
c. Chrysomenia clavellosa.† J. Ag. *h.* & *b.*
c. ——— ——— *b. sedifolius.*† Turn. *h.*

* On the Swanpool beach, not unfrequent. † Not frequent, and sparingly.

Series 2 (*Rhodospermeæ*), Fam. 15 (*Chondrieæ*), continued.

g. Chylocladia articulata. Hook. *h.* & *b.*
g. ——— ovalis. „ *b.*
g. ——— Baliformis. „ *h.* & *b.*

Fam. 16.—CORALLINEÆ.

g. Corallina officinalis. L.
g. ——— elongata. Ellis & Sol.
g. ——— squamata. „
g. Jania rubens. Lamour.
g. ——— corniculata. „
g. Melobesia agaricifolia. „
and other species of this genus. } *h.* & *b.*

Fam. 17.—RHODOMELEÆ.

g. Rhodomela subfusca. Ag. *h.* & *b.*
g. Rytiphlæa fruticulosa. Harv.
c. ——— pinastroides.* Ag.
c. Polysiphonia spinulosa.† Grev. } *b.*
g. ——— nigrescens. „
g. ——— fastigiata. „
g. ——— fibrillosa.‡ „
g. ——— violacea.‡ „ } *h.* & *b.*
g. ——— fibrata. Harv.
g. ——— pulvinata.‡ Ag. } *b.*
g. ——— urceolata. Grev.
c. ——— elongata. „
c. ——— byssoides.§ „ } *h.* & *b.*
g. Dasya coccinea. Ag.
g. ——— arbuscula.‡ „ } *b.*

* Very rarely.
† Occasionally met with, though considered an *extremely rare* plant.
‡ Local, but not scarce. § Not very frequently..

Series 3.—CHLOROSPERMEÆ.

Fam. 18.—SIPHONEÆ.

g. Codium adhærens.* Ag.
g. Bryopsis hypnoides.* Lamour. } *b.*

* These plants, the latter "rare," and the first "very rare;" found but twice each — the *Bryopsis* not sparingly.

Fam. 19.—CONFERVEÆ.

g. Cladophora pellucida. Kg.
g. ——— Hutchinsiæ.* Harv. } *b.*
g. ——— diffusa. Kg. *h.* & *b.*
g. ——— rupestris. „
g. ——— lætevirens. „ } *b.*

* Not unfrequent, though considered a rare plant.

Series 3 (*Chlorospermeæ*), Fam. 19 (*Conferveæ*), continued.

g. ———— flexuosa. Dillw. } *h.* & *b.*
g. ———— gracilis. Griff. }
g. ———— Rudolphiana.† Kg. *h.*
g. ———— refracta. Kg. } *h.* & *b.*
g. ———— albida. Huds. }
c. ———— lanosa. Kg. }
c. ———— glaucescens. Griff. } *b.*
g. Conferva ærea. Dillw. }
g. ———— æramicula. Lyngb. }

† On Flushing quay, and found only once.

Fam. 20.—ULVACEÆ.

g. Porphyra laciniata. Ag. } *h.* & *b.*
g. ———— vulgaris. „ }
g. Enteromorpha intestinalis. Sin. }
g. ———— ———— *b. crispa.* Harv. }
g. ———— compressa. Grev. } *h.* & *b.*
g. ———— ———— *b. prolifera.* Harv. }
g. ———— clathrata. Grev. }
g. ———— erecta. Hook. }
c. ———— ramulosa. „ *b.*
g. Ulva latissima. L. *h.*
g. —— Linza. „ *h.* & *b.* Local
g. —— Lactuca. „ *h.* But once met with.
g. Rivularia nitida. Ag. } *h.* & *b.*
g. Calothrix confervicola. „ }

Notice of a new species of Crisidia.

By RICHARD Q. COUCH, M.R.C.S.,

ONE OF THE SECRETARIES.

I HAVE great pleasure in adding to our Cornish Fauna a *Zoophyte*, which I believe to be now described for the first time. It was found in company with *Cellularia seruposa*, near low-water mark, at the Battery rocks.

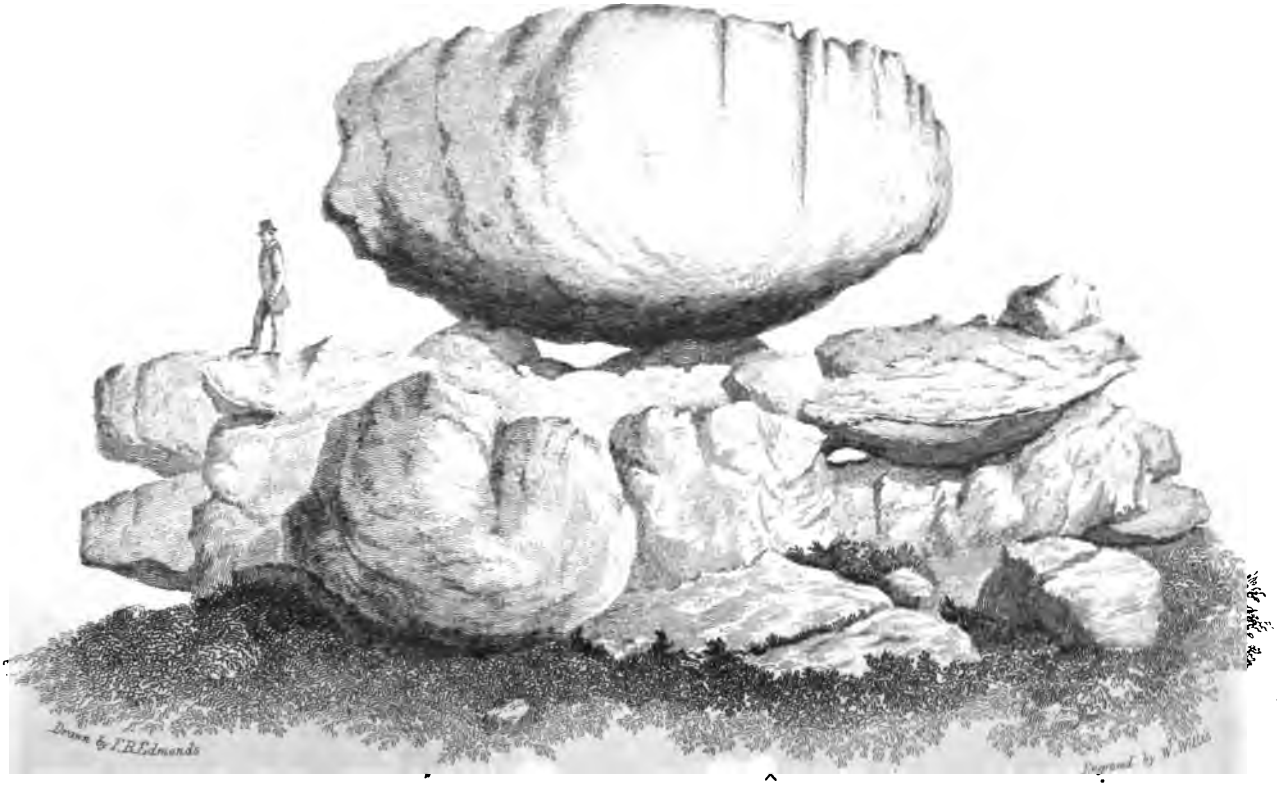
Sp. ch.—Cells tubulous, long, curved near their terminations; turned alternately in opposite directions.

Habitat.—At low-water mark, Battery rocks, Penzance.

I have hitherto procured only two specimens of this *Zoophyte*, but both have been minutely examined. It is calcareous, confervoid, slender, and about one inch in height. It is dichotomously branched. The branches consist of a single series of cells, the apertures of which are turned alternately in opposite directions. Between the origin of the branches the mouth of one of the cells opens. The cells are in a single series, long, slender and tubulous, and somewhat curved near their apertures. One cell does not arise from another by merely being attached at its extremity, as in *Crisidia cornuta*, but each rests on the one below for about an inferior third of its length, is pointed off, and at its superior termination about one-sixth of its length is free and divergent. The apertures are circular, and directed upwards. From this mode of branching, the superior cell takes its rise from the one beneath on the same horizontal plane as where it becomes detached from its cell below. In a stunted portion of one specimen, where the cells were shorter than usual, they became so closely approximated, as almost to appear biserial, and to resemble very young and loose portions of *C. eburnea;* but even in such cases there

were specific differences. But this species evidently seems a connecting link between two genera of the same family. The surface is granular and semi-opaque. The ovarian vesicles are pear-shaped, resembling those of *C. corniculata*, and occupy the position of a polype cell. It seems most closely to approach *C. geniculata*, of Johnston and Milne Edwards, judging from description; but Johnston refers to *Tibiana* of Lister as being identical with his *C. geniculata*, and if so, the present species has very little resemblance to *Tibiana* as figured by Lister,* and hence I have supposed it distinct, and, in honour of a gentleman to whom in this branch of science we are under great obligations, I propose to call it *Crisidia Johnstonia*.

* Philos. Trans., 1834, p. 385, Pl. 12, fig. 5.



THE TOLMÊN

in Constantine Cornwall

On the Tolmên of Constantine.

By RICHARD EDMONDS, Jun., Esq.

THERE is reason for calling immediate attention to the *Tolmên* of Constantine, which is perhaps the most remarkable detached rock in Great Britain. From the eastern part of Mount's-Bay this very striking object is seen on a distant hill-top about midway between Falmouth and Helston. Those who have visited the well-known *Logan-rock*, on the western part of this bay, may have some idea of the *Tolmên's* enormous size, when informed that the latter is more than ten times as large, being estimated at above 700 tons, while the *Logan-rock* is supposed to be only 70.

The *Tolmên* (from *tol* "hole" and *mên* "stone") derives its name from the hole or open space between its two points of support — an aperture distinctly visible at the distance of several miles, and so large that any person may easily walk through it. This huge mass of granite, so conspicuously mounted, and resembling an egg placed horizontally, with its more pointed end towards the south, is about 33 feet long from N. to S., 19 from E. to W., and 15 feet high. Borlase's drawing of it was taken from the E.; my nephew's, from which the present engraving has been made, was from the W.N.W., and possibly no sketch from the original will ever again be taken: for unless the rock, with as much of the cairn as is covered by it, be purchased from the present proprietor, its fragments will soon perhaps form part of the national buildings now in progress at Chatham or Plymouth, as the granite quarries have already reached within a few feet of its natural pedestal. If the three Royal Societies of Cornwall, established at Penzance, Truro, and Falmouth, were to lay out a small sum in purchasing and preserving this noble monument of Nature, it would be a lasting honor to them; but should it be suffered to perish, the disgrace to our native county would never be effaced.

Penzance, 6th Oct., 1849.

An ancient Cave, near Penzance, compared with the "Giants' Caves" in the Scilly Isles, and the "Giants' Sepulchres" in Sardinia.

By RICHARD EDMONDS, Jun., Esq.

MY last Paper but one described a supposed ancient British residence near Penzance, called "*The Fowgo*," a cave 36 feet long, about 5 feet in its greatest breadth near the centre, and more than 6 feet high, faced with unhewn and uncemented stones, supporting a roof of large flat stones, placed horizontally side by side. From Tyndale's "Travels in Sardinia," published in 1848, it appears that the remains of somewhat similar structures are very numerous in that island, where they are called "*giants' sepulchres*" (*sepolture de is gigantes*).*

"They may be described as a series of large stones placed together without any cement, enclosing a foss or vacuum from 15 to 36 feet long, from 3 to 6 wide, the same in depth, with immense flat stones resting on them as a covering. The foss runs invariably from N.W. to S.E., and at the latter point is a large upright head-stone, averaging from 10 to 15 feet high, having, in many instances, an aperture about 18 inches square at its base. On either side of this stele commences a series of separate stones irregular in size and shape, but forming an arc, the chord of which varies from 20 to 40 feet, so that the whole figure somewhat resembles the bow and shank of a spur." (Vol. i., p. 140.)

"The *Perda S'Altare*, one of the best of the *Sepolture*, is remarkable for the thickness of the sides of the grave: the total exterior length of which is 57 feet, and the width 21 feet 5 inches; though the length of the actual foss is only 39 feet 7 inches, and the width 9 feet 2 inches. The crescent which is formed of a double row of detached stones, is 57 feet in diameter. The stele" has "an aperture at the base 1 foot 9 inches high and 1 foot 8 inches wide. The superincumbent stones covering the grave are very large, one being 10 feet 3 inches long, by 7 feet 2 inches wide, and 1 foot 8 inches deep. (Vol. ii., p. 282.)

* Num., xiii. 32, 33. Deut., iii. 11. 1 Sam., xvii. 4.

The first three lines of this quotation is an exact description of the foss of "a very singular kind of barrow which obtains throughout all the Scilly Islands," except that the latter is not so long, wide, or deep, as the Sardinian foss: Borlase mentions one 22 feet long; but the longest I met with did not exceed 18 feet, and some were only 6 or 7 feet in length. Each of these rectangular caves in Scilly is, or was originally, surrounded by a circle of large stones, and the space between the cave and circle filled with small stones and earth, the whole being sometimes covered with turf, and in some instances inclosed by another circle of large stones at the distance of 4 or 5 feet from the interior one. An engraving, in "Borlase's Antiquities," of the largest which he examined in St. Mary's, Scilly, without any covering-stones, resembles the letter **O**, and he thus describes it:—

"In the middle of the barrow was a large cavity full of earth: there was a passage into it at the eastern end 1 foot 8 inches wide, between two stones set on end; the cavity was 4 feet 8 inches wide in the middle, the length 22 feet: it was walled on each side with masonry and mortar, the walls or sides 4 feet 10 inches high. At the western end it had a large flat stone on its edge which terminated the cavity. Its length bore E. by N., and it was covered from end to end with large flat stones, several of which we removed, and others had been carried off before for building."*

It will be observed that the passage at the eastern end of this cave is almost precisely of the same width as the aperture at the S.E. end of the Sardinian caves. Some of the covering-stones of those in Scilly are 6 feet long and nearly 5 broad.

In the northern hill of the isle of Samson, in Scilly, one of the larger caves merits particular notice, as it has at its higher or western end, and within the distance of a few feet, a double oval of detached stones like the foundations of two concentric walls, the longest diameter of the interior oval extending about 14 feet from E. to W. A dozen yards W. of this, and on the top of the hill, is another but smaller cave. These two caves, with the oval between, all lying E. and W. from one another, and pointing in the same direction, resemble two spurs (or two of the Sardinian caves and arcs) united,—the oval forming the two bows, and the caves the two shanks of the spurs, according to the comparison used by Mr. Tyndale. Adjoining the higher of these two caves

* Borlase, on the Islands of Scilly, p. 29. See, also, his Antiquities, p. 207.

thus lying E. and W., is another, lying N. and S., forming one of a series of such caves all pointing the same way; and on the same (eastern) side of the ridge, near the south end of it, is another double oval, similar to that above noticed, but more perfect: the passage between the concentric ovals is from 4 to 5 feet wide, and the area within the inner one, 13 feet from N. to S., and 14 from E. to W.; the entrances into the outer and inner ovals are in one direction, and from the lower side.

On the south hill of the isle of Bryher, are two very large caves, one 18 feet long and 5 wide. On the north hill are numerous others of various sizes, and occasionally small circles of stones set on their edges,—the foundations, possibly, of ancient huts. This high and now barren ground has numerous traces of ancient inclosures which, before the turf was removed for fuel, might have been fertile fields. On the eastern side of this northern hill there is a cave, 9 feet long and 5 in its greatest breadth, bearing a very striking resemblance to a modern coffin: its covering-stones are gone, but the usual stone circle still surrounds it. Another, of the same shape, may be seen on Cruther's hill, in St. Martin's island, nearly 15 feet in length and exceeding the average depth of these caves, having an entrance at its eastern end: the roof of this, too, has been removed.

It is remarkable that cromlêhs, so common in this part of Cornwall, are not found in Scilly; and that the caves, so common in Scilly, are not found here, except two or three near Carn Kenidjack, in St. Just. This, however, is not more remarkable than that above 3,000 *noraghe* (a truncated cone, from 30 to 60 feet high, and from 1 to 300 feet in circumference at the base) should be found in Sardinia, and none in the neighbouring isle of Corsica, or anywhere else in Europe.* These *noraghe*, rudely constructed of stone, without cement or ornament, are supposed to be contemporaneous with the "giants' sepulchres," and to have been "built by the very early Canaanites in their migration, when expelled from their country:"† they have one, two, or

* The Talayots *(giants' barrows)* in the Balearic Islands "are the only known buildings of a cognate character." (Tyndale, p. 122.)

† Ib. p. 139.

three domed chambers, placed one above the other, communicating by a winding corridor,—the entrance, which is invariably between E.S.E. and S. by W., seldom exceeding 5 feet by 2.* The purposes for which they were used are unknown; nor are antiquarians agreed whether the caves in Sardinia and Scilly were made for the dead or for the living, no urns nor ancient human remains having been ever found in them. The names by which they are commonly called in Scilly are, "giants' caves" and "giants' graves," the inhabitants generally regarding the larger ones as dwelling-places.

The *Fowgo*, mentioned in the commencement of this Paper, although very similar to the foss of the caves in Scilly and Sardinia, is walled to a greater depth, and appears more evidently to have been a habitation for the living. The direction of its length is about N.E. and S.W., and it has an opening at each end. It is situated on a little eminence about a third of the distance from the ancient village of Trewoofe to that of Boleigh, and is almost in the same straight line (N.E. and S.W.) with the two ancient pillars called "*the Pipers*," and the "Druidical temple" of "*Dawns-mên*," all within the extent of about half-a-mile. At the distance of 120 feet W. of this cave, and lying in a line parallel with it, are apparently the remains of another not half its length, of much less breadth and depth, and without any entrance or opening; whereas the *Fowgo* has two entrances, besides an opening in the roof of each of its two branches for the admission of light and air into them. This smaller cave may therefore have been a sepulchre for those who lived in the larger. Numerous ancient barrows of a totally different description have been opened within three or four furlongs from this spot, one of which contained the largest sepulchral urn recorded to have been found in Cornwall.†

* Tyndale, p. 111. † Ante, p. 230.

Penzance, 4th Sept., 1849.

Notice of Birds, &c., found near Liskeard.

By N. HARE, Jun., Esq.

IN further prosecuting my search this year after eggs of our Cornish birds, a nest was brought me which is believed by all those who have seen it to be that of a Dartford warbler *(Melizophilus provincialis)*. The nest was found the last week in May, built in a low scrubby thorn bush growing among thick furze, at the foot of a hedge, near St. Cleer common. It was constructed of dried grasses, and somewhat resembled that of *Curruca cinerea*, but was distinguishable therefrom in being stouter made, especially around the sides; wool, both common and Berlin, as well as furze blossoms (none of which I ever saw in a whitethroat's), were also sparingly used, and the lining of hair was much slighter. The eggs were five in number, and newly laid: they measured 8½ lines in length by 6½ in breadth, and weighed from 23 to 27 grains each. Both nest and eggs appeared to agree with the descriptions of Yarrell and Hewitson: the latter have also been compared with Hewitson's figure, and with a known specimen, and no doubt is felt as to their perfect identity. I several times visited the place where the nest was found, hoping to obtain a sight of the birds, but either they had forsaken the spot, or, alarmed at my presence, kept within the furze. So much land existing throughout Cornwall congenial to the habits of the species, it might have been expected that this warbler would be found quite common with us; such however does not appear to be the case, at least so far as this locality is concerned. Although I have been some time on the

watch for it, it has not before come under my observation. The occurrence of the present example, and of a pair of birds reported to me as seen many years ago near Looe, as also of the instances at Truro, Falmouth, and in the neighbourhood of Penzance, recorded by Yarrell in his "History of British Birds," would seem to show, that if, as is supposed, the bird is scarce in Cornwall, yet that it does not confine itself to one particular part of the county.

In the same week that the above nest was found, one of *Sylvia sibilatrix* was also discovered: it was said to have been built of the usual materials, and placed on the ground in a wood. This nest also contained five eggs, one of which is now in my possession. The bird is not uncommon in our woods during the summer, though Yarrell states he is unable to quote any recent authority for its appearance in our county lately, but the nest is extremely difficult to procure, and it was only after patiently watching the old birds for a considerable time that this was found.

Towards the end of June, a young woodcock was knocked down with a stick, on a marsh near Boconnoc, by Mr. Frost the gamekeeper to Lady Grenville. Mr. Frost informed me that in May he several times saw near the same spot a pair of old birds. This is the second instance that has come to my knowledge of the young of the woodcock having been found in this neighbourhood.

A party of birdcatchers, about two months since, went into a field near our church, with linnets and limed twigs, to catch some young finches that frequented there. Whilst the birds were "calling," a female red-backed shrike dashed down amongst them, and was caught on one of the twigs. Her intentions doubtless were anything but peaceable towards the company amongst whom she intruded herself.

An instance of the singular daring of the hawk occurred here on a market day during the present month. Whilst Mr. Moon was in his shop in Fore-street, serving some customers, he was surprised by the entrance through the doorway of a sparrow closely followed by a hawk. Nothing daunted, the latter seized the sparrow, and flew with it round the shop, but finding the door was closed to prevent his egress, he relinquished his intended

victim, and made good his own retreat by dashing through a pane of glass in the window. The poor frightened sparrow was then captured, and subsequently was restored to liberty. Many persons were passing by the shop at the time.

I have not succeeded in obtaining any more eggs of the dunlin: though strict watch was kept, not a bird has been seen for the summer. Nests of the snipe and lapwing have been found in the marshes of Trekiese and Carkeek, mostly with young birds.

Liskeard, Sept., 1849.

On Rubbings from Cornish Monumental Brasses.

By N. HARE, Jun., Esq.

THERE are about twenty out of the 209 parish churches in our county which contain monumental brasses. Some of these brasses have inscribed on them only the name, age, time of death, and arms, of the person to whose memory they were raised; others, and by far the greater number, have engraven on them full-length effigies of the deceased, and of their children, and shields of arms.

Sepulchral brasses are said to have been introduced about the middle or latter part of the 13th century, in consequence of the large space which the altar-tombs and arched monuments then in use occupied in churches. The date of the earliest existing British specimen is about 1290, and represents Sir Roger de Trumpington with his legs crossed, which denotes him a crusader. He was one of those who accompanied Prince Edward (afterwards Edward the 1st) to the Holy Land. I know of no brass in Cornwall of so early a date as this. Lysons has classed the one in Cardinhan church to Thomas Awmarle under the 14th century, and if he be correct, it must be one of the most ancient we possess. The figure is represented with a sword on the left side, certainly a most unclerical weapon for the rector of a parish to wear.

The earliest brass that I have found, which bears a date, is that of Margery Arundell, in the church of East Antony, who died on the 26th October, 1420; it is consequently now 429 years old. The latest specimen is in St. Columb Major church, and bears the date of 1633; it also commemorates one of the Arundell family.

There is another in Quethiock church two years earlier, viz., that of Isabell Chiverton, who died 25th May, 1631, a rubbing of which, as also of Margery Arundell and Thomas Awmarle, is submitted to the society, and will show the style of the different periods.

The churches of St. Columb Major and Mawgan contain a greater number of brasses than any other I have visited. They are chiefly effigies of the Arundell family, and are of the reigns of Henry the 8th, Mary, and Elizabeth: some of them are very beautiful specimens indeed.

A large number of our incised memorials have been lost, and many of those still existing have been sadly mutilated. Through the head of Roger Kingdon a nail has been driven of a size greatly to disfigure that part of it, and others there are that have escaped no better.

Many of the families whose effigies have come down to us appear to have been blessed with a numerous progeny. Of the two now before the society, one had eleven children, the other sixteen; whilst in St. Mellion church there are figures of Peter Coryton, his wife, and their twenty-four children.

The few remarks subjoined respecting the rubbings have been gathered mostly from our county histories.

No. 1.—This is a rubbing from a brass fixed in the north wall of the chancel of Cardinhan church, and is the effigy of Thomas Awmarle, formerly rector of that parish. Nothing appears to be known of him other than the inscription discloses, which is, "Hic jacet Thomas Awmarle, Rector ecclie de Cardynhan — Rogo nos ftres orate fime & ego p'nobis i'quantri possu'." The original (which is classed under the 14th century) has two shields of arms, but as they were alike, one only was taken.

No. 2. The brass from which this rubbing was taken is on the floor of the chancel of East Antony church, and represents Margery Arundell, wife of Sir Thomas Arundell of Talverne, who died the 26th October, 1420, without leaving issue. On her decease, the manor of East Antony, which she inherited from her father, passed to her sister Philippa, married to Sir Hugh Courtenay of Boconnoc, through whose daughter it descended to

the family of Carew, the present owners. The figure is placed beneath a rich Gothic canopy, 7 feet by 3, and I regret that the small size of the paper I had with me prevented my taking a copy of it. The inscription at the foot is "Hic jacet Margeria Arundell quonda duade est Anton filia Warin Erchedekne militas que obijt 26 die Octobr., Ao. dm. 1420, eui aue fpiciet de." The family of Erchedekne, or as the name was formerly written, Lercedekne, Lerchedekne, and Archdekne, resided at their castle of Shepestall, supposed to have been in Ruan Lanihorn. In 1320, Thomas le Archdekne was summoned to parliament as Baron of Shepestall, Cornwall. This title expired in 1342, on the death of John, son of the first Lord, and father of Sir Warin Erchedekne, Knight, who succeeded to the estates, but not to the title. Sir Warin married Elizabeth, daughter of John Talbot, and left three daughters, viz., Eleanor, and the above-mentioned Margery and Philippa. The arms of Erchedekne, as given by Lysons, are,—"Argent, 3 chevronels, sable." Margery is said to have been the first person interred in Antony church after its erection. With the exception perhaps of No. 1, I should imagine this brass to be one of the oldest in the county.

No. 3. Of this rubbing, copied from a brass on the floor of the chancel of Mawgan (in Pyder) church, nothing seems to be known. The figure appears to be that of a priest, but I could find no legend to aid me in determining who it is intended to represent.

No. 4. The brasses from which the rubbings of Roger and Johanna Kingdon and their sixteen children were taken, as also those of No. 5, are in Quethiock church. Four plates, containing the family arms (Arg. a chevron sable, between three magpies proper), have been taken away. The Kingdons appear to have settled first at Trehunsey, in Quethiock, and afterwards at Trenouth, in St. Cleer. The former place passed by marriage into the possession of the Chivertons; the latter was devised by Mr. Samuel Kingdon in trust for his nephew Mr. S. Davey, who sold it. There are Kingdons still living in St. Cleer, and several clergymen in the north of Cornwall are said to be descended from a younger branch of the family. The inscription beneath the

figures is, "Hic jacent Rogerus Kyngdon Johna. vx ei filij filie qr ac omes. pgenitor sevr qui obijt 3d die mense March Ao. dm. 1471, quor aiabr fpiciet ei ame." The eldest son appears to have been of some note, as he is represented in robes, with a coronet before him. William Kingdon and Edward Kingdon, supposed to be sons of the above Roger, sat in parliament for the borough of Liskeard, the former in 1452, the latter in 1467.

No. 5. The Chivertons of Trehunsey, in Quethiock, are said to have been a branch of the Chivertons of Kerris, in St. Paul, near Penzance: they became possessed of Trehunsey by marriage with the heiress of Kingdon, and for some time resided there. Richard Chiverton died the 28th July, 1617,—Isabell his wife, 25th May, 1631, leaving eleven children, as represented in the accompanying rubbings. In Carew's "Survey of Cornwall," published in 1602, mention is made of "sundrie other gent." (Richard Chiverton being one of them) who "rest beholden to this Hundred" (of East) "for their dwellings, who, in an enviable mediocritie of fortune, do happilie possesse themselves, and communicate their sufficient means to the service of their prince, the good of their neighbours, and the bettering of their own estate." In another place he says, "Chivarton signifyeth a house on the greene lay; and a castle on a greene hill is given by the gent. of that name: hee beareth, A. a castle S. standing on a hill V." Lysons mentions that Richard Chiverton of Trehunsey, and the last heir male of his family, was Lord Mayor of London in 1658. Beneath the figure of Richard Chiverton are the following lines:—

"Friends (who ere you be) forbeare
On this stone to shed a teare
Keepe thine oyntment for indeede
Bovntye is made goode by neede
Here are they whose amber eyes
Have embalmd the obseqvies
Who will think yov doe them wronge
Offeringe what to them belonge
Besides this their sacred shrine
Sleights the myrrhe of other eyene
Then forbeare when these grow dry
We will weepe both thov and I."

Beneath that of Isabell his wife :—

" My birth was in the moneth of May
And in that moneth my nuptiall day
In May a mayde, a wife, a mother
And now in May, nor one nor other
So flowers floarish, soe they fade
So things to be vndone are made
My stake heere withers, yet there bee
Some lovely branches sprovte from mee
On wch bestowe thine Aprill rayne
So they the livelier may remayne
But heere forbeare, for why 'tis say'd
Teares fit the livinge, not the dead."

Isabell was a daughter of Digory Polwhele, of Treworgan, in St. Erme. The arms of Polwhele are impaled with those of Chiverton.

Horæ Zoologicæ; *in a Letter to Miss Warren.*

By RICHARD Q. COUCH, M.R.C.S.,

one of the Secretaries.

Penzance, Sept. 14th, 1849.

Dear Madam,

I have at last endeavoured to fulfil a promise I made to you some time since, to examine the worms that might happen to fall under my notice. I have often attempted to do so, but the investigation is surrounded by so many difficulties, that I have hitherto given it up in despair. At a distance from all works and authorities on the subject, I have found it an exceedingly tiresome task to discover what other people have done. Those papers that are within my reach are so confused and contradictory, that it is not at all times possible to determine the species intended to be described. I find, too, that one species has been mentioned by some authors under different names; and by others, that different names have been bestowed on the same species; and thus, directly you enter on the investigation, you are surrounded with artificial difficulties: on the right hand and on the left, above and below, all is confusion. In furtherance of your views, I have avoided the difficulties as much as possible, by studying the creatures themselves, without reference to what others have written: if I have been able to add synonymes I have done so, but as a rule I have left them for future research: I have described them, and then named them according to the best of my abilities. This I hope will be satisfactory for the present.

The worms are so soft, pulpy, and perishable in their natures, that they ought all to be figured and described while alive and fresh. They can be preserved in spirits, but some of the finer markings become obliterated, and even the more prominent peculiarities

become so altered, that no one ought to draw up specific characters from specimens so preserved, nor ought the office of the critic to be exercised very stringently under such circumstances. To criticise figures and descriptions taken from living subjects by the light offered by preserved specimens, would be very injurious to science: it should therefore be observed as a rule, in this branch of investigation, that every figure and description should be taken from recent specimens; if otherwise, it should be distinctly so stated. If we take the genus *Neireophyllæ*, or its congener *Nereis*, so common on our shores, they are all soft and gelatinous, and of bright iridescent or metallic tints. In spirits, the colours fade or disappear by extraction; and, as it frequently happens that the colour is dependent on the food, it is also liable to numberless variations. The head and annulations unequally contract; in young specimens the contraction is nearly uniform, and the different parts become so amalgamated as to become obscure, while in the old, the more solid parts remain tolerably perfect, and the surrounding soft structures consequently become distorted into the most grotesque forms: the best mixture in which to preserve them is two-thirds of the rectified spirits of wine and one of water. The number of the annulations will not assist us to determine the species, as they are rarely alike in two specimens. The rings increase with age; and mutilations are renovated by additional developement; these last, in their early stages, are indistinct, or small and crowded, and it is only after a considerable time that they attain the age-consistency of the old, but it is not always that they do even this.

Among worms, no single organ, or even series of organs, will be sufficient for the foundation of *genera*, if the same parts are to be taken in every section of the order. The whole of the organs must be taken, and the preponderance of the developement of one part over another will be our best guide; this will of course vary in each genus.

In the present state of the investigation, it will be premature to fix on any decisive arrangement. I have placed those that I have examined in such divisions as I have already found made, and I shall adopt Cuvier's arrangement as far as I am able. When

I have more fully gone into the subject, other plans may be adopted, and if necessary I shall employ such a system as will unite our own species harmoniously together; for my object will be, rather to convey information about our own Fauna, than to make a general arrangement. They appear to divide themselves into four natural groups:—the *Suctoria*, including the leeches; *Terricola*, having short hooks or bristles for locomotion; *Errantia*, or *Dorsibranchiata*; and *Tubicola*, or those living in tubes.

I add to these remarks such individuals as I have already identified, and hope at a future time to continue the investigation. But the identification of species appears to me to be of only secondary importance; the chief is, their history, developement, and physiology, while the species themselves are merely so many recesses in which we may arrange our knowledge under definite heads, and enable us finally, by the contemplation of numerous facts, to arrive at an intelligent conclusion, regarding their individual value, and the positions they may occupy in the scale of being. The anatomy of worms is complicated in several *genera*, and in fact the whole class shows a complexity or simplicity in perfect accordance with their habits.

The *Sabellæ*, to which the sand-cases you sent me belong, will have attention directed to them soon, and it is my intention to describe the way in which their houses are built.

I hope you will excuse this long letter, and the dry detail of specific characters; without your request, I should never have touched the subject again.

I remain,
My dear Madam,
Yours truly,
R. Q. Couch.

Miss Warren.

NEREIPHYLLE, Blainville.

Gen. ch.—Body linear-elongate; segments numerous. Head distinct, more or less cordate; eyes in one pair and situated towards the base. Tentacular cirri, four on each side near the base of the head, two smaller pairs on each side of the apex. No jaws. Feet numerous, single and slender. Branchiæ numerous, one in a leaf-like expansion on the dorsal base of each foot.

This genus was first called *Nereiphylle* by Blainville, but subsequently it was changed by Johnston to *Phyllodoce*. To this there appears to be a serious objection: in the first place Blainville has the priority of right to name, and Ranzani has a genus *Phyllodoce* which is not synonymous with the *Phyllodoce* of Johnston; and then again there has been a genus of plants named *Philodoce*, a name so similar to the one proposed by Johnston, that mistakes must continually arise from its use, and hence Blainville's old name is here retained.

The whole of the species of this genus which I have had an opportunity of examining are denizens of deep water, and are rarely found nearer the shore than a little beyond low-water mark. They rarely burrow, and when they do it is generally in a light sand, where they can be under the immediate influence of the water: they most commonly seek shelter among the tangle of sea-weeds, in the cavities of bored timber, and in a few of the larger univalve shells when destitute of their real inmates. They are rather active in all their movements, even when out of the water; but in walking in water the dorsal branchiæ greatly assist by a fanning motion, like the wheel of a steamer or oars of a boat. Though they cannot suspend themselves by swimming in the water for any considerable time, yet they are capable of moving for short distances with an undulating motion from rock to rock. The dorsal fans appear to be respiratory, in addition to their function of propelling the creatures through the water; they seem similar to the fans of the *Leucodore ciliatus*.

N. maculata.

Sp. ch.—Vermiform; of nearly equal size throughout, slightly tapering towards the tail. Each annulation marked with three brown spots; one at the base, in the median line, and one on each side. Branchiæ subcordate and pedunculated.

Nereis maculata, Lin Syst. *Phyllodoce lamellata*, Johnston, Mag of Zool. and Bot., Vol. iv., p. 227, Pl. 7, figs. 1–3.

Habitat.—Near low-water mark, Mount's-Bay.

Vermiform; from two to four inches in length, and of nearly equal thickness throughout: compressed, or rather depressed. The head is distinct, oval, and larger than the first two annulations. Eyes large, and near the base; antennæ four. The annulation on which the head rests has four long stout tentacular cirri. The annulations are narrow and quadrate, and each has three dark brown spots; one on either side about the middle of the line, and a basal one about the median line. On either side of each annulation is a pedunculated leaf-like branchial expansion, veined; beneath is a foot consisting of two papillæ, the superior of which is furnished with a bundle of setæ.

The general colour of this worm is yellow, with three rows of dark spots extending from the first to the last annulation, and the sides are similarly speckled.

N. limonis.

Sp. ch.—Club-shaped; yellowish green. Head trilobate; eyes large, posterior to the anterior margin of the lobes.

Habitat.—In a piece of limestone which had been excavated by a *Pholas*, a few miles off the shore. Polperro.

The length of the specimen examined is about 1 inch 4 lines: it is stout, of a yellowish colour inclining to brown, and though club-shaped, yet slightly tapers at each extremity. The head is distinct and trilobate, with two antennæ on each side of the base of the anterior lobe, and four on each side posterior to the head. The eyes are two, large and black: the antennæ are short, and

hooked at their extremities. The annulations are numerous, narrow, and flaccid. Branchial leaflets are ovate, pedunculated, and marked with brown spots; they hang laterally, and the annulations are so narrow that they overlap each other. The first two annulations are more narrow than the others, and the branchial leaflets are very much smaller than the others. Mouth and anus subterminal. Feet numerous, and placed very much on the ventral surface, bilobed: the inferior the largest, with a bundle of retractile bristles; the superior one small, simple, and immediately below the branchial leaflet.

This is rather an inactive species, but it crawls or swims with equal speed. When kept in a basin, it would sometimes leave the water, and at others creep into the sand, or crawl beneath the stone. It would sometimes roll iself in the sand, surround itself with slime and sand, and thus make for itself a temporary shelter, which however it would very readily leave.

N. viridis.

Sp. ch.—Vermiform; lanceolate; of a sap-green colour. Branchial expansions small

Nereis viridis,—Lin. Syst., 1086. Turt. Lin., Vol. iv., p. 88. Pen. Brit. Zool., Vol. iv., p. 94, No. 3.

Habitat.—Not uncommon near low-water mark; about the roots of sea-weed; under stones, in muddy situations. Polperro; Mount's-Bay.

This worm is generally about four inches long, slender, and of nearly equal thickness throughout its whole length. The head is smaller than in those previously described, and is slightly divided into three lobes: the eyes are rather small, and not so basal as in the other species, being situated near the anterior edge of the lateral lobes. Frontal antennæ four, basal eight, four on each side, the two anterior shortest. An elongated tubercle on the front of the head, forming an equilateral triangle with the eyes. Mouth large; subterminal. The annulations are numerous and narrow, and the colour, which is of a deep green, is deepest along their

margins. The branchial expansions are small, lateral, and lanceolate, and hide the feet in a perpendicular view. The feet are small, with retractile setæ. Tail with two tentacular appendages, which give it a bifurcated appearance.

N. lamelligera.

Sp. ch.–Vermiform; yellowish-green; body smooth and glossy; head oval or cordate; eyes one pair, small, distinct; antennæ short and stout; feet similar, setigerous.

Nereis lamelligera, Turt. Lin., Vol. iv., p. 90; Pen. Brit. Zool., Vol. iv.

Phyllodoce lamelligera, Johnston, Mag. Zool., Vol. iv., Pl. 6, figs. 1–6.

Habitat.—Among the sea-weeds and crevices of the stones brought from deep water. Polperro; Mount's-Bay.

It varies in length, from four inches to a foot. The form is gradually tapering and compressed. It is glossy, and variable in colour, from a yellowish-green to a bluish tint. The head is small, distinct, and inversely cordate. The anterior margin of the head with two short tentacula on either side diverging from the median line; at the base, on either side, are four unequal occipital tentacula, jointed at their base. The proboscis is large and inflated, with about twelve rows of papillæ. The eyes are small and very distinct. The annulations are numerous and of nearly equal size. The feet are all alike, simple or but very obscurely divided, and armed with irregularly curved setæ. The upper cirrus pedunculated and subcordate, smooth, and veined like a leaf; the lower cirrus much smaller. The setæ of the feet are sickle-shaped and jointed.

This species varies in colour, not only in different localities, but when in motion and at rest: this, in the first case, apparently depends on the nature of the food it has taken; and in the second place, from the alterations produced by motion on so polished a surface as the back of this creature.

NEREIS, Cuvier.

Gen. ch.—*Nereis* have tentacula of even numbers attached to the sides of the base of the head, and a little further forwards two others bi-articulate, between which are two simple ones. One pair of jaws in their proboscis. There are to each foot two tubercles, two bundles of bristles, a cirrus above and below. Eyes, two pairs.

The worms of this genus, though more common and abundant than those of others, are nevertheless equally obscure. Though they have been more frequently described, yet, from writers referring dissimilar creatures to the same specific name on the one side, and from others applying different specific names to the same creature on the other, the confusion seems at present beyond the bounds of endurance to unravel. I have endeavoured to avoid this error myself, by taking the best authorities I can procure for my guide.

N. viridis.

Sp. ch.—First annulation about twice as deep as the second: tentacular cirri twice that length.

Nereis cærulea, Pen. Brit. Zool., Vol. iv., p. 93, Pl. 27, fig. 1; Stewart's Elem., Vol. i., p. 390; Turt. Lin., Vol. iv., p. 88.
Lycoris margaritacea, Johnst., Mag. Nat. Hist., Vol. vii., p. 230.
Nereis pelagica, Ann. Nat. Hist., Vol. iii., p. 290; Mag. of Zool., Bot., &c., Vol. v., p. 171.

Habitat.—Under stones. Mount's-Bay; Mevagissey; Polperro.

This worm varies in length to three inches, is smooth, polished, depressed, and of a greenish or metallic lustre. The head, which is always distinct from the annulations, is prolonged, narrow, and semi-cordate. Behind the head are four pairs of tentacular cirri, which are about twice the length of the breadth of the first annulation; they are jointed at the base. On each side of the proboscis is a stout inflated tentacle, jointed near its termination. Feet homologus, papillous, bilobed. Upper cirrus short, rarely extending beyond the lobe. It inhabits the sandy soil between tide-marks near low-water mark, and the crevices of the roots of sea-weeds.

N. brevimanus.

Sp. ch.—First annulation of the size of the second; the post occipital cirri twice as long as its breadth.

N. brevimanus, Mag. of Zool. and Bot., Vol. v., p. 170., No 1.

Habitat.—Deep water. Mount's-Bay; Falmouth Harbour.

This pretty worm is not common; but is sometimes found among the mud and sand drawn from deep water. The head is prolonged, compressed. Eyes black, distinct, and in two pairs. The post occipital cirri twice as long as the breadth of the first annulation. The jaw has eight serratures. The feet are bilobed and unequal, cirri rudimentary, not reaching more than half-way to the apex of the papillæ: setæ smooth. The proboscis is villous, head narrow, serratures of the jaw large and free at the point. The inferior papilla is jointed to the setigerous tubercle above; the lower lobe is smaller as it approaches the tail, and about the middle coallesces with the setigerous tubercle above. This worm is about two inches in length and one-tenth of an inch in thickness. The tail terminates in a small cordate annulation with two long setæ.

N. pelagica.

Sp. ch.—First annulation twice as deep as the second; the post occipital cirri rather longer than it is broad.

N. pelagica, Johnst., Mag. Zool. & Bot., Vol. v., p. 172, fig. 3.

Habitat.—Between tide-marks. Mount's-Bay.

Head distinct, cordate, small; eyes two pairs. The post occipital cirri in four pairs about as long as the breadth of the annulations. Teeth not reaching the apex of the jaw. The first annulation about twice the depth of the second. Lobes of the feet unequal, the dorsal cirrus about twice the length of the lobe on which it rests. The annulations vary in number from 80 to 93, are soft, iridescent, brownish, and metallic.

This species, which grows to about the length of eight inches, and about the thickness of a crow-quill, very closely resembles *N. viridis*. The head appendages are alike in both, but in this

they are not so fully developed. The indentations of the jaws differ; in this species there are ten, but they are not seen throughout the whole length of the jaw.

This is the *N. Pelagica* of Johnston, but not the *pelagica* of Turton's Linnæus.

N. Dumerilii.

Sp. ch.—Vermiform; first and second annulations equal; occipital cirri long and slender.

N. Dumerilii, Johnston, Mag. Bot. & Zool., Vol. v., p. 174.

Habitat.—In Mount's-Bay, at short distances from the shore.

The appearance of this species greatly resembles the others of this genus. It is compressed, vermicular, and creeping. It is of a yellowish-brown colour, with a line of a deeper tint over each ring. The head is small, and, tortoise-like, seems immersed in the sulcus of the first annulation. The eyes are distinct and distant; the occipital tentacular cirri very long and slender. Feet with two bundles of setæ and three papillæ, varying in different parts of the body. The dorsal cirrus of the foot very long and slender, about twice the length of the papilla on which it rests; the inferior one short

N. ruber.

Sp. ch.—Vermiform; first and second annulations nearly equal. Head large, and truncated anteriorly. Occipital cirri long, about five and a half times as long as the breadth of the annulation; the frontal cirri as long as the head.

Habitat.—Among rocks at low-water mark. Polperro.

The length of this species varies to about two inches; anteriorly and posteriorly it is of red metallic lustre, and about the centre has a green line running through the body, marking the course of the viscera. The head is distinct, large, prolonged, and its frontal surface is quadrangular, reaching to near the terminal articulation of the proboscis. The post occipital cirri are long and stout, as are also the frontal pair. The eyes are small, but distinct. The first annulation, at its anterior edge, is waved; at its posterior it is blended with the second: posterior to the first ring are three

narrow ones, after this all the others are larger. Feet setigerous; the cirrus on the upper papilla very long. Tail sub-terminal, the last annulation inversely cordate, terminating in two long bristles, which give it a forked termination. Its actions are sluggish.

Leucodore, Johnston.

L. ciliatus.

Sp. ch.—Head conoidal; eyes two pair; antennæ two, large, ciliated, and behind the head; four anterior annulations, forming a larger cone with the head, with setigerous feet; fifth larger, and plain, all the others with a branchial plate reflected on the back; anus terminal, in the centre of a concave disc.

Habitat.—In the crevices of rocks; roots of sea-weed; on *Patella vulgata*, between tide-marks; common. Polperro, Looe, Fowey, and Mount's-Bay.

This elegant little worm varies from four to eight lines in length. It is full-bodied and inactive, and but slightly tapering. The tail is a truncated black or dark brown disc, with inverted points below. Its colour is of a brownish-flesh tint, with a red line down the centre of the back. The head is small, depressed, trilobulated, and situated between two long antennæ; inferiorly it is beaked and inverted, and fringed. Eyes small, in two pairs, slightly anterior to the root of the antennæ. The antennæ are long, about one-fourth of the length of the whole body; they are stout, wrinkled, and ciliated along each margin of the flat inferior surface. Immediately posterior to the antennæ the four anterior annulations commence, forming a cone with the head, each having a papillary cirrus on either side, with retractile setæ: the fifth ring large and plain, with curved non-retractile hairs; all the other annulations nearly alike, and gradually tapering to the tail. On their dorsal surface, and not far from the foot, on either side, is a large flate leaf-like expansion, of about half the diameter of the body: this is surrounded by numerous vibratile cilia, and is nearly always semi-erect and leaning to the median line; the few last rings of

the tail are destitute of them: they decrease in size from the head to the tail. The feet are lateral and ventral, and bifid, with strong curved unequal bristles; inferiorly, the second lobe of the foot has another smaller bundle. The terminal ring is dark, and imbossed, and the posterior surface concave and punctured. The cilia are large, widely separated, very active, and voluntary.

This worm inhabits small erect muddy tubes of its own fabrication, amidst the crevices of rocks, old limpets, and *Nullipora lichenoides* and *Cor. officinalis*. It is easily detected, by the rapid undulating movements of the long black antennæ which are protruded from the tubes. If removed from the tube and placed in a glass of water, it coils itself up and lies almost motionless, and its form of feet shows it to be incapable of the usual vermicular progression.

TROPHONIA.

Gen. ch.—Body vermiform, or fusiform; head crowned with a brush of hairs.

T. Goodsirii.

Sp. ch.—Body fusiform; the first annulation smaller than the second; mouth sub-terminal. The second, third, and fourth annulations armed with setæ, so arranged as to form a terminal crown. No feet.

T. Goodsirii, Johnston, Brit. *Annel.*, Mag. Zool. & Bot., p. 371, Pl. 11, figs. 1–10.

Habitat.—In sand, in a piece of red sand-stone from deep water.

Of this pretty worm I have seen three specimens, which I can refer only to *T. Goodsirii* of Johnston. The body varies in length to 3½ inches: it is fusiform, stout, and soft, and generally about the size of a goose-quill. The annulations are distinct and slightly invaginated, of a leaden-grey inclining to brown colour. The first annulation is smaller than the second, the second than the third and fourth; the fourth, fifth, and sixth are of equal size; the remainder, about fifty-eight in number, gradually decrease in size to the last, where the termination is abrupt. The surface of the body is soft, flaccid, and semi-gelatinous, and is covered with

numerous papillæ. The head is armed with a brush of long, slender, and delicate setæ, and so are the sides of the second and third ring, which are so arranged, as to form, with those of the head, a beauti fulirideſcent metallic brush: similar, but very short bristles, are attached to each ring in two sets, but I could discover no mamillary eminences to serve as feet. The bristles are dissimilar from those observed among other worms, in being divided by internodes, and in not having the terminal jointed spine; they are frequently soiled with slime and dirt.

Dr. Johnston has dedicated this species to Professor Goodsir of Edinburgh; and no one acquainted with that gentleman's researches in natural history will object to such a compliment.

Othonia Fabricii, Johnston.

Sp. ch.—Vermiform; rings of nearly equal size, smooth, each with a tuft of long slender bristles; pointed at each extremity, with two black points on each terminal ring; branchiæ, terminal in two fasciculæ, each composed of three tufts.

Tubularia Fabricia, Turt. Lin., Vol. iv., p. 668. *Othonia Fabricii*, Johnst., Mag. Nat. Hist., Vol. viii., p. 181, fig. 19.

Habitat.—Among *Confervæ*, about low-water mark, and among *Spirorbis*. Polperro; Mount's-Bay.

This minute worm is rarely more than the sixth of an inch in length, and is of a yellowish-brown colour. The body is vermicular, gradually tapering from the upper to the inferior extremity. The annulations are thirteen in number. The feet are setigerous, and attached to every ring except the terminal ones; they move towards either extremity. The animal lives in a small mud-tube of its own making. The superior extremity which protrudes from the opening of the tube is the largest, and terminates in a trilobed manner, over which are two bundles of branchiæ, which rest in close approximation; these, when spread, are each composed of three branched and pectinated divisions. The lower, or smaller extremity, resembles the head of an eel, and the four annulations nearest are smaller than any of the others: the feet are quite retractile. At each extremity, and on the terminal annulation, are

two black spots: if these are eyes, we have the strange pheomenon of an animal having eyes at both extremities.

In habits this worm approaches the *Sabella*, but is so distinctly separated from it, as to constitute a distinct genus, which Dr. Johnston proposes to call *Othonia*, in honour of Otho Fabricius; the trivial of *Fabricii* having been given before, could not be altered.

Cirratulus, Lamarck.

Gen. ch.—Body vermiform, sub-cylindrical; segments narrow and numerous; head small, conical, labriform; eyes none; mouth inferior, emandibulate; several of the first segments naked, apodal, the others with small papillary setigerous feet, which are bifid. Body, especially near the head, with numerous long slender tendrils. Anus terminal and superior.

C. medusa.

Sp. ch.—Body vermiform, sub-cylindrical, very slightly tapering; branchial filaments originating from the anterior margin of the fourth annulation, posterior filaments scattered.

C. medusa, Johnston, Mag. Nat. Hist., Vol. vi., p. 124, fig. 13.

Habitat.—Under stones near low-water mark. Mevagissey; Polperro; Fowey; Mount's-Bay.

Length about six inches, tapering a little towards each extremity; body cylindrical, of nearly equal thickness throughout, and about the size of a duck's quill; furrowed ventrally; annulations small. The head is small, striped laterally with a single dark line, and composed of two annulations: two rings behind the head are plain. From the anterior edge of the fourth annulation, which is larger than the others, arise numerous long slender filaments, which are generally in slow motion: irregularly from the other segments filaments also arise, longer than those nearer the head; they arise dorsally and laterally, and are of a paler colour than the body, are transversely furrowed, with a darker line down the centre. The feet are in two bilateral rows, papillary, setaceous, and small: the superior foot largest, with the more numerous and larger bristles,

bent near their points. The colour is of a lemon-yellow, with darker tints marking the viscera; filaments of a sienna colour, inclining to brown. These branchial filaments coil and twist round the body.

C. tentaculata.

Sp. ch.— Vermiform, sub-cylindrical, of nearly equal size throughout; segments narrow and numerous. Branchial filaments numerous about the fourth and fifth annulations, but irregularly scattered over the rest of the body.

Terrebella tentaculata of Montagu.

Habitat.—Under a worm-eaten piece of cork; Polperro; rare.

The only specimen of this species which I have seen I found in cork, lying on a muddy soil, near low-water mark. The body is about the size of a crow-quill, and of nearly equal size throughout. The annulations are narrow, very numerous, and furnished with two bundles of small bristles inserted into two papilliform feet. There are no eyes. From the fourth annulation, and less so from the fifth, arise numerous long, slender, vermiform tendrils, which are so entwined, as to hide the body beneath; these are irregularly scattered over all the annulations, except a few posteriorly. The fourth and fifth annulations are larger than the others. Mouth inferior, sub-terminal; anus sub-terminal, last annulation pointed.

The general colour of the specimen was a lemon-yellow, with light sap-green patches, indicative of the viscera.

This species will I think be found to be a variety of *C. medusa*. The specimen obtained corresponded with Montagu's description, and I have therefore supposed it identical with the species he described; if so, Dr. Johnston is mistaken in supposing Montgu's description referred either to a *Terrebella* or *Nereis*.

Serpula tubularia.

Sp. ch.—Tube cylindrical, tapering; flexuose towards its posterior extremity, where it is fixed; aperture smooth entire.

S. tubularia, Mont., Test. Brit., Vol. ii., p. 513; Pen., Brit. Zool., Vol. iv., p. 362; Johnst., Mag. Zool., Vol. vii., p. 126, fig. 23.

Habitat.—Deep water, on shells and *Eschara foliacea*. Polperro; Mevagissey; Mount's-Bay.

This is the largest of all our *Serpulæ*, as it is also the most beautiful; and though it is by no means very rare, it is never common, being in general solitary. The shell is long and tapering, sub-flexuose, and attached posteriorly; it is about the size of a goose-quill at its larger extremity, and is cylindrical and smooth. The animal is vermiform, compressed, distinctly annulated, and very much smaller than the external calcareous shell; it is of a bright orange colour mottled with brown or green, depending apparently on the nature of the food it has taken. The posterior two-thirds of the body is tapering, and closely annulated, with lateral elevations, one on each side, which give it a ridged appearance; the ventral portion is convex, and the dorsal has a central depression, or is grooved throughout its length. The anterior third of the body is largest; its frontal extremity is truncated, and from it arise two large fan-like bundles of filaments; they arise from two stout round footstalks which soon expand into triangular discs, from the upper edges of which numerous slender filaments arise; these filaments are yellow spotted with red, simple, with short vermicular appendages on one side. The anterior part of the body is encased in a membraneous sheath; this is pierced on each side with seven bundles of partially retractile setæ, placed at equal distances from each other. The worm is very timid, never protruding beyond the peduncles of the branchiæ.

S. triquetra.

Sp. ch.—Sheath calcareous, irregularly vermiform, attached throughout, with circular furrows; a dorsal ridge throughout, which projects over the mouth as a triangular spine.

S. triquetra, Cornish Fauna.

Habitat.—On stones, from low-water mark to deep water; common.

This species varies in length from one inch to an inch and half, the worm much smaller. The tube is white and variously contorted, marked with irregular transverse furrows, with a dorsal ridge or spine which runs the whole length of the tube, and ends in a triangular projection over the mouth. The animal is vermicu-

lar and stout. The annulations are numerous, and much longer anteriorly than towards the tail. The six anterior annulations are much larger than all the others; they are prominent, with six pair of tufts of setæ which pierce a transparent sheath; there are in reality two tufts; the setæ of the other annulations are merely rudimentary. Anterior to, and over the first annulation, is a large mantle, which is irregular at its free edge; out of this arise two peduncles, which terminate in two large bundles of ciliated tentacula. These tentacula are ciliated branchiæ; the filaments are jointed, and from each internode arise two opposite branches; the branches are long, stout, and ciliated along their margins. There are two opercula, one of which is rudimentary and club-shaped; the other is as long as the branchiæ, and its termination is inversely conoidal: the operculum itself, however, is liable to considerable variations. The base of the cone, which is distally situated, is sometimes smooth, at others waved. Sometimes there is a double cone; at others, one cone is surmounted by a ball, in various stages, from a mere rising to a ball held by a small placental attachment; and all these I have seen on the same stone frequently infested with parasites.

S. vermicularis.

Sp. ch.—Tube calcareous, generally of a vermilion colour; attached nearly throughout its whole length; frequently the anterior portion is free. Mouth entire; patulous, or bell-shaped.

Tubus vermicularis, Ellis, Coral., p. 98, Pl. 36, fig. 2.

Habitat.—On stones and corallines from deep water; not uncommon.

The tube is calcareous, irregularly winding, red, tapering, but not convoluted, and marked with irregular but strong and well defined circular elevations. Though frequently attached throughout its whole length, yet the anterior portion is frequently free and elevated. In its course, it is sometimes twisted to the right, in others to the left, while in some specimens it is entirely straight. The length varies to three inches, and the aperture is round and

everted, or patulous. The animal is vermicular; the lower portion is red or brown, and annulated, with small tubercular elevations on each side. The head is obtusely truncated, and is enveloped with a mantle, which surrounds the back and hangs free from the body; ventrally it is cleft to the termination of the head: this is surmounted with a collar, from which arise two pedunculated tufts of bright red branchiæ, arranged in a fan-like manner. Between these tufts, on the ventral aspect, arises a long slender footstalk, surmounted with a large inverted cone, which is striated, and acts as an operculum.

This species has been confounded with *S. tubularia*, and the next, *S. triquetra*. Some authors apply the *tubularia* to *triquetra*, and vice versa, till the whole subject is enveloped in the most perfect confusion. My *tubularia* is the one described by Montagu, and figured by Johnston, in the Mag. Nat. Hist., Vol vii.; the *vermicularis*, the one figured by Ellis: and my *triquetra* has always a triangular projection over the mouth of the shell: I mention this to prevent any further increase of confusion.

Arenicola, Lamarck.

Gen. ch.—The worms forming this genus are peculiar. In certain characters they resemble the *tubicolæ*, in others they approach the *A. errantes*, and yet they differ so considerably from both, that a separate genus must be formed for their reception. The *A. tubicoles* have the branchiæ arranged round the head more or less modified; here they are distributed over the body, and they become dorsibranchiate. The annulations are in reality large, but these are again divided into smaller segments, so that the rings seem numerous and small. The head is obsolete, or it should rather be said the worms are acephalous; the anterior extremity is pointed and conoidal, and well fitted for burrowing. The mouth is terminal, and has a slight proboscis. The anterior rings are large and distended, and without branchial tufts. The central portions have both setigerous feet and branchiæ, the posterior is both without feet and branchiæ. There are neither eyes nor cirri.

Arenicola ecaudata.

Sp. ch.—Vermiform; branchial tufts more than twenty.

Lumbricus marinus, Turt. Lin., Vol. iv., p. 58; Pen. Brit. Zool., Vol. iv., p. 64, Pl. 20, fig. 2; Stewart's Elements, Vol. ii., p. 354; Rogel's Bridgwater Treat., Vol. i., p. 277, fig. 135; Johnst., Mag. Nat. Hist., Vol. viii., Pl. 54, p. 566.

Habitat.—In the mud and sand between tide-marks; common.

This large worm is soft, full, and flabby, and not very active; it varies in length to 8 inches, and is from a light to a black green colour. The rings are numerous and narrow, and every four seem to compose a single large or primary one. The head is pointed and conical. The anterior fourteen rings are setigerous, but without branchial appendages; to all the others is a dark red arborescent branchial tuft: the anterior and posterior tufts are smaller than those of the middle rings. The surface is soft, flaccid, and softly granular.

There are several species of this genus found on our shores, but they have not yet been sufficiently defined: at some future time this may be done.

All the luggworms inhabit soft muddy sand between tide-marks: they live in holes, and not in tubes of sand as is the case with *Sabella*. The head is downwards, and with it the excavations are effected. They live on sand: the animal and vegetable matter contained in it is digested and absorbed, and the sandy excrement is thrust to the surface in those sand-coils frequently observed between tide-marks. They are used as bait by fishermen.

On the Hill-Castles, Cliff-Castles, and other supposed British Dwelling-places, near Penzance.

By RICHARD EDMONDS, Jun., Esq.

THE numerous "hill-castles" and "cliff-castles" whose ruins are still seen near Penzance, were probably the walled towns of the ancient Britons, constructed some centuries before the Christian era.

The most perfect of our *hill-castles* (which are all circular or nearly so) is that of *Ch'un*, lying partly in Madron and partly in Morvah, and (by the map) nearly five miles W.N.W. from Penzance. It consists of two stone walls: the inner one, which is 12 feet thick, was considered by Borlase to have been 15 feet high; and the less massive outer one, 10 feet high;—the remains having been in his time much more than they are now. The green space, 30 feet in breadth, between the two walls, might have served for the flocks and herds in times of danger, whilst their owners may have dwelt within the area of the inner wall in buildings, like pent-houses, erected against it; for in Borlase's time were walls 3 feet high, apparently parts of such houses. The area of the inner wall is between 50 and 60 yards in diameter, and the entrance into it is from the west, in a line with *Ch'un Quoit*. The entrance through the outer wall is about a dozen yards south of that line. Both gateways were evidently very strongly fortified. Except at these entrances, I could find no trace of any wall running across the green space between the outer and inner walls, although Borlase, in his plan of the castle, describes two such traverses very distant from each other and not near the entrances. At the foot of the hill, and about half a mile N.E. by E. of the castle,

are the remains of the supposed British village of *Old Bossullow*, lately described by Miss Millett.*

Castle-an-Dinas, in Ludgvan, 3 miles N.N.E. from Penzance, stands on the highest hill in this neighbourhood, and must have had two very thick concentric stone walls like those of Ch'un, with a like annular space of about 30 feet in breadth between them. Nothing, however, of the inner wall remains but its foundations, which encircle a space about 80 yards in diameter; the other stone wall is above 12 feet thick, and though now only 5 feet high, was probably more than double that height. It is surrounded, at the distance of about 45 feet, by a vallum of earth and stones. A second vallum had been begun, but it does not reach half round the first. The Gothic tower, erected by the late John Rogers, Esq., of Penrose, the father of the Rev. Canon Rogers, the present proprietor, is in a ruinous condition. The tower and the unfinished vallum are on opposite sides of the fortress. This castle, like that of Ch'un, had a well within it. Very excellent models of these castles have been made by the Misses L. and M. Millett, and presented by them to the society.

Trecrobn Castle, in Lelant, crowns a very abrupt hill about 2 miles E.N.E. of Castle-an-Dinas, and consists of a single wall of large stones and earth inclosing the hill-top. Trecrobn signifies the "round town."

Caerbran Castle, in Sancreed, 4 miles W. by S. of Penzance, had a stone wall at least 12 feet thick, surrounded by two ditches, with an intervening earthen mound, still very perfect towards the N.E., and in some places 15 feet high. The two ditches and the mound are about 60 feet in breadth. The stone wall is no longer standing, but its former vast breadth and height are still indicated by its foundations and extensive ruins. In the centre of the fortress are the remains of a round stone building, probably the citadel. This castle resembles very nearly the description of the "lofty hill city" and citadel of *Old Sarum* (a Celtic structure, about a mile from Salisbury, or *New Sarum*), except that the diameter of the area within its fortifications was about 200 yards, whereas that of Caerbran is only about 120.

* Ante, p. 286.

The dismantled appearance of our stone-walled castles has, in all probability, resulted from the removing of their choicest stones for modern buildings. Borlase imagined that they were dismantled, for the purpose of rendering them useless.

Bartinney Castle, three-quarters of a mile W. of Caerbran, stands on a very high hill, but its wall does not appear to have been of great strength. Near its centre are three circles of stones from 7 to 9 yards wide, like the foundations of dwellings.

Castle Horneck, (commonly called *Lezingy Round*) on the hill-top immediately above the seat of Samuel Borlase, Esq., and about a mile west of Penzance, is a circular inclosure of nearly an acre and a half (now planted with fir trees), formed by a broad and high annular mound of earth, still in good preservation. But the similar mound, which formed *Castle Lescudjack*, immediately over the eastern entrance of Penzance, has been much injured by agricultural improvements.

Contemporaneous, to all appearance, with these hill-castles, and constructed as much like them as the difference of situation allowed, are our *cliff-castles*, consisting of points or tongues of land, fortified by inaccessible cliffs towards the sea, and by thick stone walls, mounds, and ditches, towards the land. One of the largest of these has been seen by all who have visited the celebrated Logan Rock of St. Levan, although very few of them have been aware of it; for the only ruins which the guides call "Treen castle," are those of a small castle within the main one, which last would be quite as complete without it as with it. In walking thither from the village of Treryn (Treen), the first striking object that presents itself on reaching the open common, is an ancient entrance through a broad and lofty vallum, with a ditch on its external or northern side, extending E. and W. to the edges of two fearful precipices, the vallum being highest where most accessible from the land. Passing through this opening towards the Logan Rock, we arrive first at some small vallums and ditches and then at a stone wall 12 feet thick extending eastward and westward to considerable distances, to protect the castle wherever it had not been sufficiently fortified by nature. About seven hundred feet further towards the south, down a steep declivity, and beyond a very narrow isthmus

defended on each side by precipices, is an ancient stone wall with a gateway. This southern termination of the fortifications (which is all that the guides shew) is not less than 900 feet from the northern entrance.

Maen Castle,* (the property of James Trembath, Esq., of Mayon House,) about half a mile N.E. of the Land's-end, has a large vallum and massive wall of rocks with an intervening deep ditch; the wall, ditch, and vallum being most perfect on the north side of its once well fortified gateway. Adjoining this cliff-castle, are remains of numerous ancient inclosures for cattle or agriculture. From its western extremity is a fine view of the long vertical fissure through the isthmus of the Land's-end. This castle, too, like that of Treryn, is not shewn by the guides, so that strangers who visit the Land's-end rarely or never see it.

Four or five furlongs, N.N.E. of Cape Cornwall is *Kenidjack Castle,* adjoining which likewise are traces of numerous ancient inclosures.

Nearly five miles further on towards the N.E. is *Bosigran Castle,* within which is a flat logan rock many yards in circumference.

A mile and half still further on is Gurnard's head. Grand as this headland is, it would doubtless have been more so, had its rocks been granite instead of slate; but the contrast which its cliffs of slate exhibit, when compared with those of granite, which almost every where else prevail, is very striking, and the change will not be regretted. Here, too, are some remains of an ancient castle, called in the Cornish language *Treryn-dinas,* the same name as that of St. Levan cliff-castle first described. *Tre* signifies "town," *rhyn* "promontory," and *dinas* "palace."

The cliff-castles now mentioned are the only ones on this peninsula of which any remains now exist, but the remains of all these, with the exception of the last, are very considerable.

The *Giants' Castle,* in St. Mary's, one of the Scilly Isles, is of a similar description, the stone wall being very thick and the approach to it protected by two low vallums of earth and two

* This is spelt *Mean* in the Map of Cornwall and in the old title deeds, but the Cornish pronunciation of *mean* is the same as that of *maen.*

ditches. The cliff on which it stands, although less lofty, is not surpassed in grandeur by those of our own castles. The enormous horizontal slabs that crown it, and upon which every visitor stands to view the sublime scenery below and around, extensively overhang a fearful precipice.

Having thus described the principal hill and cliff castles near Penzance, including one in Scilly, I may here observe that the variety of magnificent views which they command is very great, while the castles themselves, built perhaps between three and four thousand years ago, during the period that the earliest Tyrians traded with us for tin,* carry us back to within a few centuries after the flood, when perhaps the ancient hills on which they stand first received their present forms.

The remains of what may have been a British residence, of a very different kind from any of the foregoing, may be seen in the parish of St. Just, within 200 yards E. from the top of Carn Kenidjack (5½ miles W.N.W. of Penzance), immediately above a deep well near a new and slated cottage: they are called the *Carnyorth Circles.* The lower one consists of the basis of a circular or oval stone wall between 6 and 8 feet thick, faced on each side with very large stones; the area which it encloses, and which averages about 30 yards in diameter, being occupied by what appears to have been foundations of huts or apartments. Eight yards above this are the remains of another circular wall of stones and earth, not so thick, but inclosing an area of about 90 yards in diameter, wherein probably the tenants of the lower buildings kept their cattle. The walls might have been surrounded by a plantation of trees or furze, and have thus corresponded in miniature with the cities of the ancient Britons, who (says Strabo) fence in very large circles with trees, where, having constructed huts, they and their herds dwell together.†

There are two other ancient circular inclosures, close to one another, at *Castle Cayle,* in the parish of Phillack, nearly a mile north-west of Fraddam, and by the eastern side of the great

* See Woodley's Scilly Islands, p. 23. Dr. Stukeley's Stonehenge, p. 32. Num. xxxi. 22. Is. i. 25; & xxiii. 1, 7, 8. Ezek. xxvii. 3, 12.

† Fosbroke's Antiquities, p. 530.

road. Each consists of a thick and lofty annular mound of earth thrown up from the deep ditch which surrounds it. "The little round" is about 40 yards in diameter, "the great round" about 60; the latter lying to the west of the former, and on somewhat higher ground. These mounds are so near each other, that in the intervening space their ditches unite.

I have only farther to remark, that near the two circles of Carn Kenidjack, before described, and within 200 yards S.E. from the hill-top, on a surface almost covered with loose rocks, are several detached small circular inclosures of stones set upright, very similar to the supposed ancient huts lately destroyed in Trewren, and described in a former Paper.* These, probably, are the remains to which Miss Millett alludes in her recent communication already referred to.†

When we contrast the rude comfortless dwellings of our remote predecessors with our present well-built and well-furnished houses, and also contrast the continual insecurity in which they lived with the uninterrupted tranquillity in which we now dwell, what a subject for gratitude is presented! and the opportunity of making this contrast is surely a sufficient reason (had there been no other) for preserving to future generations these remains of huts, villages, and walled towns, which have for so many centuries rested on our barren hills.

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* Ante, p. 247. † Ante, p. 286.

Penzance, 6th Oct., 1849.

On the fragments of a Bronze Furnace (supposed to be Phœnician) discovered near St. Michael's Mount,—the Iktin *of Diodorus Siculus.*

By RICHARD EDMONDS, Jun., Esq.

I use the word *Iktin* advisedly, having been informed by a friend, who has consulted the best editions of the original work at the British Museum, that this is the word used by Diodorus, and not *Iktis;* for which last name, although universally adopted, the only authorities are his translators, French and English as well as Latin, who, as *Ictin* happens to be in the accusative case,* have assumed that the nominative was *Iktis,* whereas (admitting the word to be declinable) *Iktin* might be the nominative with as much propriety as *Ictis.* Moreover, the most ancient name by which the Mount was known, after it became a religious cell, was *Dinsell,* or *Dynsull,*† a mere corruption probably of *Iktin-cell,* or *'Ktin-cell.*

As *Ictin* thus appears to have been the ancient name of the Mount, let us dwell for a moment on its etymology. *Ik* being the Cornish word for *cove* or *port, Ik-tin* signifies *port-tin* or (according to the English idiom) *tin-port*‡—a name as appropriate and at the same time as indefinite as could have been given by the Phœnicians, who sought to conceal the place from whence they procured their tin. It is generally supposed that they obtained their tin first from Spain: when they had discovered it in Mount's-Bay, and had exported it from the *Mount,* they might, in order to

* "εις την νῆσον προκειμενην μεν της Βρεττανικης ονομαζομενην δε 'Ικτιν."—*to an island close to Britain named Iktin.* Lib. 5. c. 22.

† Carew's Survey of Cornwall, edited by Lord de Dunstanville, p. 376.

‡ In the Celtic, it mattered not whether *ik* or *tin* were placed first. The word *porth,* for example, which is synonymous with *ik,* sometimes *follows* the name to which it is joined, as in *Perran-porth,* although generally it *precedes* it, as in *Porth-curnow.*

distinguish it from their Spanish tin, have called it *Bre tin* (Mount tin), *bre* being the Cornish word for *mount.* Now *Bretin*, by our continental neighbours, is pronounced *Bretagne*—the very name of that part of France which is called after Britain; so that *Britain* and *Bretagne* are apparently mere different pronunciations of *Bretin.** The name by which tin was known amongst the Phœnicians and Chaldeans has undergone considerable changes since its introduction into European languages. While the Saxon, Dutch, and Danish word is the same as our own, the Swedish word is *tenn*, the German *zinn*, the French *etain*, the Latin *stannum*, the Irish *stan*, the Cornish *stean*, the Armoric *stean* and also *staen*, the letter *s* in each of the last four words being probably a mere prefix, as in the modern word *sneeze* for *neese.*†

It may be inferred, from the account given by Diodorus, that no smelting-works existed in the ancient *Iktin:* and we may safely conclude that St. Michael's Mount never had any; for they are invariably erected near streams, and no stream is found there. The stream nearest it is that flowing into the sea at Marazion; and its banks must have been one of the most convenient spots in Mount's-Bay for a smelting establishment. On this very spot, traces of such an establishment have been discovered. The stream being lately diverted, flowed westward to a considerable distance along the base of the adjoining sand-hillock, rapidly undermining it and washing away large portions. In sections thus made, I saw, at the depth of between 12 and 20 feet beneath the surface, the remains of ancient walls rudely built of unhewn stones mixed with clay, and near them great quantities of ashes, charcoal, and slag or the vitrified refuse of smelted ores, such as may be seen near any tin-smelting house at the present day—grains of tin being frequently imbedded in the slag. Some very ancient broken pottery, of rude manufacture, was also found, and much brick.

* This new derivation of *Britain* will not appear improbable, when we consider that the most striking object, as well as chief place, in the very small part of Britain known to the Tyrians, must have been the Mount, then called *Bré.* The learned Bochart derived the name *Bretanikee*, the Greek for *Britain*, from the Phœnician or Hebrew words *baratanac* (the land of tin).

† See Job xli. 18.

But the most extraordinary discovery which my nephew and myself made when we had removed a portion of the sand, within a few inches of one of the walls, was, two fragments of a bronze vessel resting on a layer of charcoal. A considerable portion of the charcoal had combined with the metal during the lapse of ages, and a beautiful green substance had resulted, closely resembling, and no doubt identical with, malachite, or the carbonate of copper. The fragments were each about six inches long, four wide, and only about 1–20th of an inch thick, having been apparently parts of the circular top of a vessel three feet in diameter, the mouth being bent back into a horizontal rim three-quarters of an inch broad. The charcoal adhering to the vessel was exclusively on the outside. It seems highly probable that this furnace was brought hither by the Phœnicians; for it is recorded by Strabo that they furnished us with "earthenware, salt, and brass (or bronze) utensils" (χαλκωματα*) in exchange for our tin, lead, and hides. Cæsar, too, has stated, that the "brass" (or bronze) which the Britons used was imported. (*Ære utuntur importato*†) Robert Hunt, Esq., at whose request I have presented a fragment to the Museum of Economic Geology, has been so kind as to analyze a small portion of the metal, the following being the result:—

Weight, before analysis, 25 grains.

	Grs.
Copper	18· 0
Tin	2·25
Iron	1· 0
Loss, as carbonic acid and oxygen—the copper being partially in the state of carbonate, and much of the tin in oxide	3· 0
Earthy matter	0·75
	25· 0

* Geograph. iii. 8. See Ezra, viii. 27, and Ezek. xxvii. 13.

† De bello Gallico, V. 10.

The supposition that these remains have been buried for at least 2,000 years, and that the sand has occupied all that period in covering them to their present depth, agrees with my suggestion to the Royal Geological Society of Cornwall, in 1846, respecting the origin of our sand-hillocks; which appear to have proceeded from the sands drifted from the sea-shore by violent winds, and to have been "for the most part accumulated imperceptibly upon a continuously growing vegetable surface, the deposits during a single storm being too slight to cover the herbage or to check its growth, except occasionally when they were sufficiently copious to bury it almost entirely." These very ancient ruins, therefore, with the fragments of a bronze vessel, the broken ancient pottery, the abundance of ashes, charcoal, and slag, all covered by the sands of many centuries, appear to indicate the very spot where, as Diodorus relates, the tin was purified previous to its conveyance in carts to the neighbouring island during the recesses of the tide.

Another argument has suggested itself in favour of this conclusion: the merchants who first purchased the ores and purified them for sale are generally supposed to have been Jews; indeed, the rude smelting-pits, containing the dross of tin and charcoal, which are occasionally found in Cornwall, and were no doubt commonly used prior to the erection of any general smelting establishment, are everywhere called Jews' houses.* There is, too, a tradition, that our stream-works were "first wrought by the Jews with pickaxes of holm, box, and hartshorn," tools frequently "found amongst the rubble of such works;"† but as soon as the natives had acquired the art of mining, the Jews probably purchased the ores from them, and established a depôt and market

* The practice, "was to dig a hole in the ground and throw the tin ore on a charcoal fire, which probably was excited by a bellows." This was attended with "an undue consumption of fuel and a great loss in the produce of the ores, as the more stubborn parts would not give way to that degree of heat which by this method they were able to apply." To this cause principally Pryce ascribes the destruction of our woods. (*Pryce's Mineralogia Cornubiensis*, p. 281.)

† Carew's Survey of Cornwall, p. 26. Norden, p. 12. "Scawen in his MS. adds that the Jews, as well as Phœnicians, were very ancient traders in Phœnician ships." Buller's Account of St. Just, p. 5.

near the recently discovered smelting-works. Now, it is remarkable that the town on whose borders these works were erected, is considered the most ancient in the county;* and what is still more remarkable, each of its two names is a record of the fact of its having been a market of the Jews. The names are *Market-jew* and *Marazion*. In the latter, *Mara* is a contraction of *Margha* "market," and *Sion* is the Hebrew for "mount." Assuming, therefore, that it was originally inhabited by the Jewish tin merchants, it was natural for *them* to call it *Marghasion* (the name on the Town Seal) or the "Mount-market," from its proximity to, and dependence on, the Mount; whilst the native miners, thinking more of the Jews, to whom they were carrying their ores, would call it *Market-jew*.

* Davies Gilbert's Cornwall, Vol. ii., p. 215.

Penzance, 6th Oct., 1849.

Description of Scomber punctatus, *a species of Mackerel not hitherto recognized by Naturalists.*

[Plate III., fig. 1.]

By JONATHAN COUCH, Esq., F.L.S., &c.,

MEMBER OF THE SOCIETY.

THE fish, of which I have the pleasure to lay a figure and description before the society, is not noticed in the great work on Ichthyology by Cuvier and Valenciennes, and, therefore, may be judged to be of very rare occurrence.

The family of mackerels has been so restricted by Cuvier that the genus *Scomber* is distinguished from those of *Thynnus*, *Orcynus*, *Auxis*, and *Sarda* (of all which some specimens have been taken on the Cornish coast), by the absence of a corslet on the body. Restricted thus, there are two species of the genus *Scomber*, or true mackerels, that are known to visit our shores; the first, or common mackerel, forming the subject of extensive and prosperous fisheries; and the second, the Spanish mackerel (*Scomber Colias* of Mr. Yarrell's "British Fishes"), of uncertain occurrence, being sometimes taken in quantities of a few scores or hundreds, and at other times not being met with for several years.

This last-named fish is distinguished from the common mackerel by its heavy and less elegantly formed head; but, remarkably, by numerous regularly defined spots on the belly, of an oblong form, and about the size of the section of a pea, and largest as they run parallel with the lateral line. As this was the only species of mackerel known to naturalists that is marked with numerous defined spots, it was with much probability supposed to be the species briefly

described by Rondeletius, under the title of "du coguoil" in the French edition of his work, p. 192, and "de colia" of the Latin copy, p. 285, and as the work of this ancient naturalist is not of common occurrence I will add his account of the fish: "Κολιας *(Colias)* c'est celui, selon mon advis, que l'on appelle à Marseille coguoil, du tout semblable à un maquereau, hors mis seulement qu'il est plus grand é plus espés. Il est couvert d'ecailles petites e tenures, é ha les traits du dos courts, é merqués de taches noires. Il ha une partie de la teste si claire qu'on i voit par le travers les nerfs descendans du cerveau aux jeux, qu'on appelle optique, comme par le travers d'un verre. Aux printems il jette du sang resplendissant comme le sang de la pourpre. C'est un poisson rare en nostre mer, frequent en Hespaigne, é plusieurs autres lieux." Besides the remarkable transparency which he describes, in the skull, of which I observed nothing, there appears to be an obscurity in another part of this description, as compared with either the Spanish mackerel *(Scomber Colias* of Cuvier) or the species I am now about to describe. The words of Rondeletius seem to imply that the back was marked with short lines, somewhat like the common mackerel (as I have myself observed in the *S. Colias*, though they are fewer in number and more distant), and also that the spots are on the same part of the body with these clouded lines (which certainly is not the case in the fish usually considered the *S. Colias*, as described by Cuvier or seen by myself). Unfortunately the figure engraved by Rondeletius does not remove this difficulty, since it is altogether free of such dots, either above or below; but his remark, that the fish was frequently found on the coast of Spain, must have satisfied Cuvier and Valenciennes that the fish they knew as the *Colias* was the same as that referred to by Rondeletius; and no other kind of mackerel with which it can be confounded is described in their eighth volume of 'Ichthylogie.' Under these circumstances there is reason for believing, that if Rondeletius ever met with this fish it could have been subjected to nothing more than a cursory inspection, and that he subsequently cofounded it with the somewhat more common Spanish mackerel; and as it certainly has not been since recognized by any naturalist, it may safely be pronounced a species new to science.

This specimen was caught in a seine at Looe, July 6th 1848; and I owe the possession of it to the kindness of Mr. Clement Jackson, of East Looe. The length was 15½ inches, and the general proportions were those of the common mackerel. The more minute differences will be pointed out at the conclusion of this description. The first thing which attracted attention, in comparison with a common mackerel which lay beside it, were the scales, which covered the surface of the sides and belly, where none at all appears in the common species. These scales were conspicuous, appearing to be marked out by the crossing of minute lines running transversely, and their rounded edges appeared as if directed forward. There was no corslet, but above the pectorial fin there was some appearance of it, in a line of denser scales, which vanished under the pectoral fin. The first and second dorsal fins were three inches apart,—and the posterior edge of the former was more extended backward, and the groove that receives it longer, than in the other mackerel. Lateral line waved. First dorsal fin, 12 rays; second dorsal fin, 11 rays; pectoral fin, 20 rays. The tail rather more slender; and the attenuated portion of the body, close before the caudal fin, depressed and square. But the most remarkable distinction between this and the other British mackerels was in the colour, which was a uniform dark neutral tint over the head and back, without any coloured bands or variegations—it might be termed an olive bluish green, with green reflections at the sides; and from before the eyes, along the back and sides to the tail, the surface was thickly covered with spots, of the size of a small pea, generally round and well-defined, but a little larger and elongated transversely on the summit of the back. The spots end a little below the lateral line, and the belly is a pure white; the surface between the carinations of the tail a bronzed yellow colour. A membranous process unites the fifth ray of the first dorsal fin with the back; but this may not be a permanent character. I found this specimen a female, large with roe, and destitute of a swimming-bladder,—as is also our common mackerel, and I believe also the *S. Colias;* but the remark becomes important, as some species of this genus are possessed of this organ, and one sort is only to be definitely distinguished from the common mackerel by being supplied with it.

Having obtained a figure, of the size of Nature, and a description, I sent this fish with the drawing to my friend Mr. Yarrall, to be added to his collection, and also to obtain his opinion with regard to its identity with any known species; and a portion of his reply is as follows:—"On comparing the preserved skin of our fish with your representation, I observe some points of distinction, which, though slight, may increase the amount of differences. Your fish appears to be less deep in proportion to its whole length than the old mackerel; the measurement being $2\frac{3}{4}$ deep by 15 7-16ths, or as 1 to $5\frac{1}{2}$; the old one $3\frac{1}{4}$, by $15\frac{5}{8}$, or not quite 1 in 5,—and this is remarkable, as your example was a female, and the roe large, as the time (July 6) would of itself indicate. The mouth in your fish appears to be smaller, the angle of the gape not placed so far back, and the superior maxillary bone is shorter and broader. The posterior edge of the preoperculum is more rounded,—in our mackerel the lower two-thirds of this edge is almost a straight and perpendicular line; the anterior portion of the lateral line, appears to be more strongly marked." To this may be added, that the adult common mackerel is distinguished from its younger condition by a dusky mottled line, which runs along the side and separates the lateral line from the belly. Nothing of this sort was found in this fish, though of full growth and large with spawn. In reply to my suggestion of a name, Mr. Yarrell says, "*Scomber punctatus* would be an excellent name for it, as referring at once to its most obvious external markings."

Polperro, Cornwall,
March, 1849.

PROCEEDINGS OF THE GENERAL MEETING

OF THE

Antiquarian & Natural History Society

OF PENZANCE,

HELD IN THE MUSEUM OF THE GEOLOGICAL SOCIETY,
FRIDAY, OCTOBER 4TH, 1850,

The President, JOSEPH CARNE, Esq., F.R.S., F.G.S., M.R.I.A., in the Chair.

The following gentlemen were elected the Officers and Council for the ensuing year:—

President.

Joseph Carne, Esq., F.R.S., &c.

Vice-Presidents.

T. S. Bolitho, Esq. | John Scobell, Esq.
Rev. Canon Rogers, | Augustus Smith, Esq.

Council.

J. S. Bedford, Esq. | R. Branwell, Esq. | R. Pentreath, Esq.
D. B. Bedford, Esq. | E. Bolitho, Esq. | Rev. M. N. Peters.
J. J. A. Boase, Esq. | R. Pearce, Esq. | J. Trembath, Esq.
Dr. Willan.

Treasurer.

Richard Long, Esq.

Secretaries and Curators.

E. H. Rodd, Esq. | J. N. R. Millett, Esq.
Richard Q. Couch, Esq.

DONATIONS TO THE SOCIETY,

FOR 1850.

Transactions of the Royal Institution of Cornwall. By the Institution.

Report of the Royal Cornwall Polytechnic Society. By the Society.

Letter to Lord Brougham, by J. Wild, Esq. By the Author.

Hand and Ring of Mummy. By J. H. Tremayne, Esq., of Heligan.

Two Indian Gods taken from Lahore; and Saragossa Weed from the Gulf stream. By Mrs. Major Davies.

A series of Fossil Sharks' Teeth, from the Crag series near Woodbridge, Suffolk. By W. D. Saul, Esq., F.G.S.

Insects; Beetles, *Lucanus cervus*, &c. By Miss Millett.

Ancient Seals of Cornish Boroughs; and Rubbings from Brasses. By Mr. Hare of Liskeard.

Two Models,—Trevethey Stone near Liskeard, and Carwynen Cromlêh. By the Misses Matilda and Louisa Millett.

Specimens of Natural History,—*Pholas papyracea, P. dactylus, P. candida*, &c. By W. C. Cocks, Esq.

Natural History of the County of Stafford. By R. Garner, F.L.S.

Thirteen species of *Zoophytes*, laid out and named:—*Laomedea geniculata; Thoa muricata; Sert. filicula, operculata, argentea; Antennularia antennina; Plumularia falcata, cristata; Cellularia reptans, scruposa; Serialaria lendigera; Membranipora pilosa; Flustra foliacea.* By Master Pentreath.

Specimens of Insect Architecture. By Master Tracey Millett.

Specimen of the Pilot Fish. By E. Ley, Esq.

Night Heron. By Rev. Canon Rogers.

PRESIDENT'S ADDRESS.

IT is a strong proof of the utility and importance of such institutions as ours, and of the increasing interest felt in them, that the Parliament, in the last session, passed an Act to enable the Mayor and Council of any municipal town having a population of not less than 10,000 persons, with the consent of a majority of the Burgesses, to establish a Library and a Museum, principally of Natural History, and to impose on the inhabitants a yearly rate of one halfpenny in the pound, to defray the necessary expenses. The Libraries and Museums so created are to remain the indefeasible property of the inhabitants, and are to be open to the public at reasonable hours, free of cost. Penzance probably does not yet come within this Act, with respect to population; but were it otherwise, I am convinced that we should not think it advisable to resort to it, considering it far preferable that our public institutions should be supported by individual liberality. It may however be worthy of consideration, whenever we shall obtain space enough properly to arrange our museum, whether we cannot increase its utility, by making it more accessible to the public.

The increasing importance of those institutions is also evinced in the revived activity and energy of old establishments, and in the liberal hand with which they now apply their resources to the accumulation of new treasures. In the course of the past year, two gentlemen,—Dr. Acland and Dr. Carus,—were for a considerable time resident in the Scilly Islands, for the purpose of collecting objects of natural history for the Radcliffe museum at Oxford. I had the pleasure of several interviews with the last-mentioned

eminent naturalist, and learned from him that their researches had been very successful. Several weeks before he left the islands, I found he had discovered upwards of 100 species,—chiefly *naked Mollusca, Medusæ*, and the lower orders of *Crustaceans;* of these, ten or twelve were quite new, and had never been described, and about as many others were of extreme rarity: some he had obtained by dredging, but most of them by merely turning up the stones at the farthest point of low water: they were generally found adhering to the under part of the loose rocks: many of them were so minute that their forms could be distinguished only by the aid of a microscope. He was particularly anxious to obtain a specimen of that rare fish the *Amphioxus lanceolatus*, of which only about half a dozen had been previously taken (the first of them in Cornwall by Mr. Couch of Polperro); and sailing on one occasion near the Seven-stones, in 32 fathoms water, he threw over his dredge, and, to his great joy, brought up two of them. Amongst his other treasures he has found the *Synapta*, and all the varieties of compound *Ascidians* described by Forbes. Of the class *Echinodermata*, he found the *Thalassema* in a rock at St. Martin's, near low water mark: this however, although extremely rare, had been previously found in Cornwall: he also found the *Cucumaria* or sea cucumber, and the *Holothuria*,—very rare,—at the Golden-ball bar, and at St. Helen's: amongst the *Molluscs*, the *Eolis lansberg*, of which only one had before been discovered, was found at Toll's island. My object in alluding so particularly to these circumstances is to direct the attention of our members to the treasures of natural history which exist almost at our own doors, and to shew how much may be accomplished by the energetic researches of an individual, on a spot which had previously attracted little attention from naturalists. There is no reason to doubt that most, if not all, of the species and varieties which have been thus discovered in the Scilly Islands, may be found also in our own bay.

There is another object to which I beg to call the attention of the society. A collection and a classed catalogue of the *Algæ* or marine plants of Mount's-bay are still desiderata in our museum: these, I have no doubt, will be found much more numerous than most of us have any idea of. Collections have been made of the

Algæ of Falmouth harbour, of the northern coast, and of other parts of Cornwall, and I hope these products of our own bay will not remain long undescribed: some of them may possibly be so far in the water as to be beyond the reach of ladies: in these cases gentlemen will, it is hoped, collect the plants, that the ladies may dry and preserve them. I have lately been informed of a case in which the collection of *Algæ* has been turned to a very beneficial purpose. It being necessary to rebuild the church of St. Agnes, in this county, where large contributions could not be expected, the benevolent feelings of a lady prompted her to endeavour to aid in the work by collecting *Algæ*,—principally on the northern coast,—and arranging them in small cases for disposal; and in this apparently trifling, but interesting way, she added to the funds upwards of forty pounds.

I am glad to perceive on the table before us a small collection of the shells of St. Ives bay, and specimens of insect architecture, and another of *Zoophytes;* which deserve particular notice as having been made and presented by two very youthful labourers in the science,—the first by Master Tracey Millett, being his second donation; the other by Master Pentreath: their successful commencement will I hope induce others to follow their worthy example; and as one of the objects of their pursuit in the next year, I would suggest to them to make a collection of the lichens which cleave to our rocks, keeping in their remembrance that the specimens should be not less than two and half inches square, wherever they can be obtained so large.

I should make some remarks on the change which has been so evident in the direction and progress of the shoals of pilchards in the present year, and on the visitation of the blue sharks to our coast; but I am happy to find that the society will have a communication on these subjects from a gentleman who is far better acquainted with them. The natural history of the pilchard is very little known, and may well become one of the subjects of our investigation.

The study of antiquities has recently received an extraordinary impulse by the establishment of the Archæological Society, the researches of whose members have been abundantly successful. More Roman remains have been discovered within the last few

years, than in a much longer previous period. Of such remains we have very slight traces in Cornwall: with the exception of a mere outline of a supposed Roman camp at St. Erth, and some traces of one of the Roman roads, our relicts of the Romans are almost entirely confined to the coins which are frequently discovered. Our remains of antiquity are principally, if not entirely, British; but what havoc has been made of these, through the destructive operations of the modern Goths, within the recollection of many of us! it is therefore an object of great interest and importance to obtain correct representations of those which yet remain: had this been done even fifty years ago, several which are now nearly obliterated, would still exist in their models. Repeatedly have we had reason to express our obligations to the Misses Millett for their admirable models of several of our cromlêhs, inscribed stones, rock circles, ancient entrenchments, &c. At our last meeting I remarked that they had completed models of all the cromlêhs except two, which were too distant to give us a hope of obtaining them: distance, however, was no obstacle to the zeal of those ladies, who have now presented to us models of the Trevethey stone near Liskeard, and the Carwynen cromlêh near Pendarves, thus completing the series of cromlêhs. We may well regret that the immense tolmen,—called the main-rock,—at Constantine, is so far off as to forbid our indulging the hope of obtaining its model.

It gives me great pleasure to announce to you that there is now a hopeful prospect of obtaining better accomodation for our society and our collection, in a building which is likely to be erected by the Cornwall Geological Society. We are well aware that many additions will be made to our museum as soon as there shall be space to exhibit them: we are glad therefore to indulge the hope that our specimens will not much longer remain huddled together for want of room, as they are at present, but will be so displayed as to shew both the value and the beauty of our collection.

Wherever we may behold the works of Nature; whilst they command our admiration, awake our interest, and invite our investigation, finding,—as we always shall find,—that there is in the most minute objects sufficient to excite our wonder and baffle our faculties, we shall, I trust, never forget "to exalt above all, and over all, the wonder-working hand of heaven."

THE Council in presenting its annual report will very briefly refer to the labours of the society during the past year, and then state its present position and prospects.

No one visiting our museum, or examining our reports, will require to be informed of the continued activity of our members. The shelves of our museum are crowded to excess, and offer much matter for further investigation. The society was instituted for the preservation of such objects of antiquarian interest, and for the collection of such specimens of natural history, as occurred within our district; and on both these subjects the council has great pleasure in saying it has been eminently successful.

The Druidical monuments in this neighbourhood (which have been frequently threatened with injury or destruction) have, through the exertions of the society been hitherto preserved. At the request of some of our members Mr. Freeman, the proprietor of the granite works here and at Penryn, has promised that none of the men in his employ shall injure any of the antiquities scattered around us. He has also engaged to exert his influence to prevent any injury of that remarkable rock, the Tolmên, in Constantine, figured in our last Report. Mr. Freeman's known zeal in such matters will, it is believed, check any attempt to infringe his orders on such subjects. We have in our collection a series of exquisite models of the antiquities of Cornwall, which would adorn any position in which they could be placed; the space at our command, however, is so

very limited, that we have been obliged to crowd them together in such a manner, that nearly all their beauty has been hidden from view. At present we can command no more extended accommodation; this the council much regrets, for our present collection now embraces all the most striking of our Druidical monuments. We have this day received two additional models of cromlêhs, for which we are again indebted to the skilful exertion of two ladies, members of our society, and to them our warmest thanks are due. The council has also received an additional series of the rubbings from the monumental brasses of the churches of Cornwall, by Mr. Hare of Liskeard, from whom we have also received impressions of the ancient official seals of several of our Cornish boroughs. For the efficient exhibition of these, as well as our other antiquarian riches, we require fully three times the amount of space now at our command. Our collection is thus rapidly increasing, and as it does so, this deficiency will be more severely felt, if it does not altogether paralize our exertions. In other departments of our labours we suffer equally from the same cause. Among the objects of natural history, we have reason to know that collections of shells, and also of *Crustaceans* and *Corallines*, supplying many of our deficiencies, have been formed for our museum; but the donors are waiting till we can provide space for their reception and exhibition. We are most desirous of carrying out the object contemplated at our formation,—that of making our museum an index to all the natural productions of our neighbourhood. To do this, we must provide for the reception of the skeletons or stuffed skins of all our quadrupeds, birds, and fishes; our labours, therefore, are hardly yet begun. Among the *Mammalia* we have not yet ascertained the species of seals that frequent our shores, and the smaller kinds of shrews, &c., are all but unrecognized. These and many other kindred subjects the society has not yet touched. The desiderata here enumerated will, from the activity of our members however, be soon supplied when space can be allotted for their reception: this, if the society is anxious for prosperity, must be soon supplied. But though the council has been limited in its exertions from these causes, it has yet continued its investigations to the best of its powers.

MAMMALIA.

During the past year several specimens of the dolphin *(D. delphis)* have occurred in Mount's-bay. This species may now be considered so common as not to require any special notice.—The rarer kind, *D. melas*, or leading whale, has been seen on two or three occasions, but none have been captured.

BIRDS.

The investigations into this branch of our inquiries have been carried on with unabated vigour. Though we cannot record the capture of any species new to our *Fauna*, yet we have had opportunities of noticing the occurrence of several of great rarity. Our peninsular character and extreme westerly position confer great interest on our ornithological pursuits. During the past year nearly every part of the kingdom has been visited by large flights of waxwings *(B. garrula)*, and many were observed in our own district, several of which were taken. The elegance of shape and plumage of this bird makes it highly interesting, independent of its great rarity.

A second example of the purple heron, in adult plumage, was captured in the spring on Trevider moor, in St. Buryan. This is among the rarest of our birds, and deserves especial notice. Among the less rare, we have taken the night heron, hoopoe, and an adult spoonbill in Scilly, species that must not be passed over in silence. Another specimen of Temminck's stint, has been observed this autumn: in this instance the specimen was an adult bird, all the others were young birds of the year.

FISH.

Among the fish we have to record the occurrence of the stone bass *(S. Couchii)* taken near fragments of floating wreck off the Logan-rock. The streaked gurnard *(T. lineata)* is not unfrequently captured in trawl nets, but it never takes a bait, and in this it differs from all its kindred species. Among the rarer fish observed in Mount's-bay must be noticed the tunny, striped bonito, and the belted bonito. The Twaite and Allis shads are taken in abundance by means of drag seines, on the Marazion shores, during the latter

part of summer. During the past year we have received visits from naturalists, from different parts of the kingdom, who have been similarly occupied as ourselves. By means of their researches, the oblong and round sunfishes have been taken. In Scilly three specimens of that very rare fish the lancelet (*Amphioxus lanceolatus*) have been found by means of the dredge. Beside these many others of unusual occurrence have been captured. Extensive researches have also been made into the habits and migrations of our fish, which may at some future time be presented to the society.

CRUSTACEA.

To the *Crustacea*, no additions have been made, but the species inhabiting our shores have been again examined, and their developement again traced. Among the prawns we believe however a new species has been detected, but further research is required before this can be distinctly asserted. We hope during the ensuing year, that several communications on interesting portions of the history of these creatures will be laid before the society.

ZOOPHYTES.

Among the *Zoophytes*, two new species have been added to the British list. Researches have been made in this department by a member of our society, and a Paper on the subject of their extraordinary vital powers will be laid before you to-day. In addition, two new species of *Flustra*, and a new *Cellularia*, must be added to our *Fauna*.

What we have hitherto effected, therefore, is as nothing, when compared with what yet remains to be done: we have approached but to the threshold of our designs. Our collection of *Mammalia* is imperfect; our Birds are incomplete; our Fish are few,—our *Mollusca* untouched,—*Crustacea* altogether unrepresented; of our *Zoophytes* we have scarcely any; of our Sea-weeds, and general Botany, we have nothing; and yet all our space is fully occupied. This, the council is obliged to confess, is not what it ought to be, and it has also great pleasure in saying, not what it will be when you can afford room in which the activity of your members may display itself.

The Society was constituted with the avowed object of forming a museum, and investigating the antiquities and natural history of the district; and yet we are brought to a stand, almost before the work has commenced. The continued activity which we have had was evidently not foreseen. It is gratifying however to find that our difficulties arise from our success; but this ought to be a stimulus to further exertion, rather than a cause for the abandonment of our original design.

The council observes, with pleasure, that the committee of the Royal Geological Society of Cornwall have determined to erect a building suitable for the reception of its great collection. As it is now no longer doubtful but that the design will be carried out, your council would urge the society to take such steps as may secure for themselves full accommodation under the same roof,—accommodation, not only for our present collection, but for all that may be likely to be added to it. The council would earnestly press this subject on the attention of the society at the present time; for what may be comparatively easy of accomplishment now, may at any future time be an insurmountable obstacle.

J. N. R. Millett,
Edward Hearle Rodd,
R. Q. Couch,
} *Secretaries.*

Oct. 12th, 1850.

On the causes of the great vital powers of the Hydra, or Fresh-water Polypus

By RICHARD Q. COUCH, Esq., M.R.C.S.,

ONE OF THE SECRETARIES.

IT is not my intention on the present occasion to enter into any general declamation on the beauty, harmony, or the pleasures of natural history, or recount any of the wonderful phenomena connected with the subject. This, indeed, might easily be accomplished; but however successful our efforts, it could be outdone by a bare recital of some of the strange things that force themselves on the attention of the student of Nature at every step of his progress. The history of the *Hydra*, or fresh water polypus, with all the extraordinary properties of its life, though made familiar to us by popular writers on natural history, fills us with as much astonishment now as it did at the first day of its announcement. It is a fruitful theme for the lovers of the marvellous, but one, I believe, which has not yet received any satisfactory explanation, and therefore still lies involved in its own mysteriousness. In fact the phenomena witnessed in the *Hydra* are of such unusual character, and apparently so far removed from all the ordinary occurrences which we witness, that they seem to partake rather of the supernatural, than the real; and had they not been fully confirmed by subsequent observers, would not be believed. However remarkable they may be, others almost as strange may be found in every department of Nature. We cannot suppose that any new and isolated power is given merely to excite our wonder,

or to serve the economy of a creature such as this. It is by far the most philosophical to consider it as the developement of a general law,—a law common to all vitalized tissues,—but very peculiarly exhibited in the creature in question. With this view of the case it has been examined, and the results will now be laid before you.

It is not my intention to enter into all the particulars connected with the subject, as that is done in almost every elementary work on zoology; nor do I intend even to refer to all the experiments that have been made, illustrative of the matter: I shall speak of them only so far as they are necessary to understand the explanations that will be offered.

A polypus is of an oval form, of a jelly-like consistence, and at the upper surface there is an opening which leads into the stomach. Around the orifice is arranged a coronet of arms, by which the food is taken and conveyed to the mouth. The *Hydra* adheres to the plant on which it rests by means of a small sucker. In structure it is very simple, for the only organ that can be discovered is the stomach, and that appears to be merely a cavity or depression in the general body, without particular organization. Externally it is smooth, and both internally and externally there is a continuous investing membrane. Between the two surfaces there are immense numbers of minute cells or grains irregularly distributed in a gelatinous envelope; and in fact, of this structure the creature is almost entirely formed. The arms are however slightly more complex; they are hollow and filled with a nearly fluid substance; at short intervals there are denser wart-like protuberances, spirally arranged, covered with minute spinous projections; with these they capture their prey. Between the tubercles are narrow muscular bands, by which the various movements of the arms are performed. The simple granular structure of the body, with the higher organization of the arms, are worthy of special attention.

But it is not in its high organization that the celebrity of the *Hydra* resides; it is, in fact, among the lowest, if it be not the lowest, in this respect, of which we have any account. It is in the vast powers it possesses of resisting, or rather of overcoming, injuries of apparently the most destructive kind that its great

interest resides. Nothing short of annihilation seems to have the least power over its vital properties. If the head be separated from the body, the body acquires a new head, and the head a new body; if it be divided perpendicularly, so as to separate the head and stomach into two portions, the separate parts immediately supply the deficiencies, and both become as perfect as the original. If the body be slit open, and turned inside out, the separated edges again unite, and the external surface, now inverted, performs the office of the stomach as perfectly as the other. Divide the body in any direction, and the same power of renovation ever developes itself; nay, if you even mince the body into fine fragments, each separate piece developes itself into the perfect polype. It has been said that the same things will take place in the tentacula, or arms, if they be similarly mutilated, but this I have not yet witnessed; for if these be mutilated the truncated portions will develope themselves again into perfect parts; just as the crab will reproduce a claw which has been lost; but the part separated from the body does not, I think, possess this reproductive power unless a portion of the body is attached to it. If a portion be removed from the body, the wound rapidly heals; but if the part be merely irritated with a needle, or a ray of the sun, a young one will sprout from the injured parts. The time necessary for the performance of these extraordinary feats depends in a great measure on the temperature, but in summer it can be performed in four or five days.

In addition to these phenomena, which may be considered as the effect of accidents, it may be remarked that the young sprout from the sides of the parent in the manner of buds, and as perfect as the parent stem. This most frequently takes place about midway between the arms and the base; but they will sprout also from any other part, except perhaps the arms. In all such cases, the original cells of the polype possess a power of reproducing cells similar to themselves to almost any extent, provided there is with the cells the liquor or fluid called *blastema*. In the reproduction of the young by sprouting, the first process appears to be an increase in the number of the cells at a given point; these bulge from the surface of the parent, and finally become a perfect

Hydra. This process has been supposed by some physiologists to depend on the presence of some impregnated germ-cells retained within the body, and derived originally from the parent, and in fact that these can alone give rise to the phenomena. This however appears to be contradicted by the fact, that if a polype be divided into a great number of pieces each will grow into a polype as perfect as the original, and this secondary race will be as capable of undergoing the same process as the first. From this, and other similar experiments, it is evident that the power resides in most, if not all, the cells forming the body, and that too for many successive generations.

If the polype be examined under the microscope, it will be found that there is no difference between the cells of the old and young, or even of the nascent germ. The cells of the adult are therefore no more developed than those of the egg, and it is on this circumstance I think that their very celebrated powers depend. The cells are in a state fit for any vital process, and they can reproduce new ones to almost any extent. It matters therefore but little whether they produce a new creature by sprouting from the side of the parent, or develope a new progeny by building up the amputated parts, the process is the same.

It would be very uninteresting before an assembly like the present to attempt to enter into a description of the manner in which the cells are formed; our present design is rather to shew the properties they possess when formed, and before they have undergone any change into the more complicated organs. If they have once suffered an alteration, their powers, as witnessed in the *Hydra*, are thereby diminished, and that too in proportion to the degree of elaboration. In the most simple cell, as seen in the egg destined to produce a bird, or indeed any other creature, the germ will be found to be composed of a single cell, which compared with others afterwards seen may be said to be large. This contains within itself a darkish spot,—a vital or germinal point. This bursts or disappears altogether, or rather is converted into a nucleated cell, altogether distinct from the first. This new one divides into two, and these into four, in every respect, except size, similar to the first. In this manner the whole mass is divided into a granular mass

and every grain possesses the properties of the original. In some cases a different order is occasionally observed, but the process is the same, and the result is identical; for every small cellule contains within itself a portion of the vital germ. At this point the cells are fitted for any process which may be required in the development of the animal to which they belong. If the nature of our task would allow a minute account of the formation of these cells, with the order and appearances they assume, the manner in which they change from one condition to the other, the gradual process by which they are eliminated into the different and complex organs of the different races which people our earth might be given; and these, instead of being wearisome, would fill us with admiration at the simple, beautiful, and efficient process, by which vital creation is reared to all its splendour and perfection from a single cell. It must not be supposed that the whole process of developement has been, or can be, at present, explained; it is meant only to imply that enough has been discovered to render the process intelligible, and to lay the foundation for future discoveries. All the cells in the divided state, just described, are in the condition best fitted either for producing a repetition of themselves, or further developement. They are the ready materials which Nature has prepared in furtherance of her designs.

If we now return to the polypus, it will be found that it is composed of materials altogether cellular; for with the exception of the arms, or tentacula, the whole of the mass has undergone no alteration from the purely primitive character. If, therefore, a few cells be separated from the parent, these stimulated to activity by the injury, produce all the phenomena which have for so long a time been deemed wonderful. It will now be seen that this process so far from being peculiar to the polype, is common to all vitalized beings, having the same, or similar, structures. Any number of cells removed from the body are capable of producing these effects; but those forming the tentacula, or arms, having undergone an advancing change, are consequently not able so readily to present these phenomena. According to some observers, however, they are occasionally found producing the same changes, and this may probably be the case, since a few of the cells may not have under-

gone any alteration, and these, in whatever position they may be placed, possess the same vital powers. I have never on any occasion been able to observe it, nor have I been able to find any distinct experiment on this point, but it is likely to occur.

Creatures closely allied to the *Hydra*, the *Sertularian* species of Mount's-bay, present the same phenomena. Though encased in a horny sheath, yet the central, or most highly vitalized portions, are composed of the same granular kind of pulp, and are liable to the same changes. The stomach is a simple cavity, excavated in the body, without particular organization; and the connexion of the different polypes is effected by the simple and granular communication of the central pulp. If these creatures be kept in impure water they get unhealthy, and the head and arms drop off: but if they be again supplied with fresh water for a few days they form a new head and arms as perfect as the organs they had lost. At certain seasons of the year they produce cells much larger than those of a more permanent character. These, at first, are composed of the granular pulp of the stem; afterwards the pulp becomes furrowed, and finally formed into cells, by division in the manner previously described, with the exception that each now formed is composed of a great number of smaller cellules. After a short period they separate from the parent, and undergo a process of developement which has been fully described in a former number of our Reports. If these cells attain a certain size, they are developed into eggs; if they are stunted by cold, they are formed into polypes; while if from unfavourable causes they are still smaller, they grow into branches; and thus we see that according to circumstances different organs are capable of being eliminated from the same structure. This closely allies the animal with the vegetable kingdom; the same law obtains in both. This is very beautiful, and it shows how all organs may be formed from the same primary tissues.

Sir J. G. Dalyell, in the Edinburgh Philosophical Journal (*1836), describes several interesting particulars connected with this subject. In speaking of the *Hydra tuba*,—"On April 23rd an adult was detached from its site; in four days a bud had issued from one side of the base, and a large protuberance with a row of papillæ, an originating embryo was rising from the other. On the

2nd of May, these had elongated into perfect tentacula like those of the adult. Another protuberance was now visible on the opposite side, which gradually grew into a perfect polype and began to feed on the 7th. On the 30th of May separation had taken place; four individuals were observed, and one was in the process of developing two others. These were extremely voracious; they were fed with the flesh of muscles, and in proportion as they were fed was their power of converting their food into creatures like themselves." This was no doubt owing to the simplicity or primarary cellular condition of their structure.

It has been remarked before that the germ-cell is, under certain circumstances leading to developement, divided up into a number of other cells, and these, again and again dividing, form the cellular groundwork from which all the other tissues are produced. As long as they retain their simplicity of structure or primal condition, undergoing no change, so long do they retain the powers which have excited so much wonder in the history of the *Hydra*. The change having been once effected, all these powers are destroyed.

If the egg of any bird be examined, it will be found that this multiplication of simple cells is among the first things observed. But if the process be carefully watched, it will be seen that all the cells thus formed do not at once enter into the texture of the young. They are inclosed with others but undergo no change. On this the subsequent developement of different organs may depend, and in this the power of the metamorphoses observed among the insects and *Crustacea*, &c., may reside; at least in those creatures having the largest amount of unappropriated cells the metamorphosis is most apparent.

Among some of the reptiles, which possess the power of reforming an amputated leg, or indeed of any other part, the number of undeveloped cells pervading the body must be great. As these creatures possess the power of renewing lost or amputated parts, and that too when the injury has been repeated, a question of interest may arise whether this power is resident in these undeveloped cellules? This can of course be only conjectural at present, but it seems not improbable; for if such powers are

developed in the *Hydra* by their means, similar effects may arise from the same cause among the reptiles.

The crabs possess a power, not only of renewing their youth by the shedding of their shells, but also of re-producing a lost claw. There is a limit however to the power of casting the shell; for what is repeatedly done with ease at first, becomes slow and laborious at last and finally the creature dies from the attempt.

The strange and extraordinary powers of the *Hydra*, which seemed so miraculous to our forefathers, and even now forcibly arrest attention, have under the powers of the microscope yielded us the secret. From the remarks that have been made, the explanation is rendered clear. The first investigators of the subject seemed so struck with the unusual and marvellous phenomena, that they deemed it necessary to call in the aid of a special law to enable their minds to comprehend it: the law was not to explain, but merely to render the subject tangible. Now, however the case is altered, and special manifestations are discarded, all matter must be subject to the laws of matter; in addition to which, all vitalized or organic structures must be liable or subservient to the common laws of life. Notwithstanding the apparently marvellous character of the vitality of the *Hydra*, the laws regulating organic developement must explain the whole. It is true these matter of fact investigations may dispel that halo of uncertainty which has hitherto surrounded the subject, and with it may remove a portion of that interest which some associate with the obscure; yet they enlarge our knowledge, and enable us more fully to understand the mysteries of creation. The microscope is a powerful aid in such researches; it not only shows the character of any structure submitted to its powers, but it tells us the method adopted by Nature in its formation. By its assistance, we see that the strange powers of the *Hydra* reside in no superadded quality, but are the natural results of a law common to all organized structures—a law which was as perfectly developed in the older organisms of our globe as at the present time.

List of Marine Algæ, *found in West Penwith.*

By J. RALFS, Esq., M.R.C.S., &c.,

HONORARY MEMBER OF THE SOCIETY.

IN forming a catalogue of the marine *Algæ* of this district, I shall do so with reference to Miss Warren's List of Falmouth species inserted in a former Report. By proceeding in this way, I shall, I conceive, render the following list more interesting, and at the same time reduce its bulk, by omitting most of the plants that are common to both districts.

I have arranged the *Algæ* which I shall notice in three divisions.

In the 1st, are those species found at Falmouth, but not hitherto detected here.

In the 2nd, are the species found here, but not mentioned by Miss Warren.

The 3rd contains such species in Miss Warren's list as are not of common occurrence, or have only lately been recognized as British plants.

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1. *Algæ* found at Falmouth, but not in this district:—

Mesogloia Griffithsiana
**Asperococcus Turneri*
**Dictyosiphon fœniculacea*
**Cutleria multifida*
**Sporochnus pedunculatus*
**Fucus ceranoides*
†*Callithamnion brachiatum*
———— *gracillimum*
Griffithsia corallina
†*Ceramium nodosum*
Microcladia glandulosa
Dudresnia coccinea
———— *divaricata*
†*Kallymenia Dubyi*
Nitophyllum Gmelini
———— *Bonnemaisonia*
Laurentia tenuissima
Rytiphlæa pinastroides
Polysiphonia fibrillosa
*———— *violacea*
Cladophora Hutchinsiæ
———— *diffusa*

†*Cladophora gracilis*	*Conferva ceramicola*
———— *albida*	*Ulva lactuca*
———— *Rudolphiana*	

* *Algæ* which are usually found in sheltered bays or at the outlets of rivers, and therefore less likely to be gathered in West Penwith.

† *Algæ* which may be *expected* to be met with on our coast.

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2. *Algæ* gathered in this district but not mentioned in Miss Warren's list:—

**Elachistea velutina*	I always find this species accompanying *E. scutulata.*
Ectocarpus pusillus	Land's-end & St. Michael's Mount, in autumn.
———— *Mertensii*	Marazion; spring.
*———— *fasciculatus.*	
———— *Hinchsiæ*	Common on *Saccorhiza bulbosa* in summer.
Sphacelaria olivacea	St. Michael's Mount and Sennen cove; autumn.
———— *fusca*	St. Michael's Mount.
———— *filicina*	Long rocks; very scarce.
**Myrionema Leclancherii.*	
*———— *strangulans.*	
Ralfsia verrucosa (*R. deusta*, Harv.).	St. Michael's Mount and Mousehole; autumn.
Chlorosiphon Laminariæ.	
**Striaria attenuata*	Battery rocks; rare.
Chorda tomentosa	Long and Battery rocks; rare.
Laminaria fascia.....	St. Michael's Mount, &c.; spring.
Alaria esculenta.....	Mount's-bay and Sennen cove.
Fucodium (*Fucus*) *tuberculatus.*	
†*Callithamnion spongiosum*..	Whitsand bay.
*———— *polyspermum.*	
*———— *pluma.*	
**Ceramium acanthonotum.*	
*———— *flabillegerum.*	
*———— *strictum.*	
Dudresnia moniliformis ...	Mousehole.
Halymenia furcellata	Mount's-bay.
Rhodomenta ciliata	
Nitophyllum punctatum b..	Mount's-bay; rare.
*———— *ulvoideum*....	Mount's-bay.
Chylocladia parvula	Penzance; autumn.
Gigartina acicularis	Mousehole.
———— *Griffithsiæ*	Long rocks; rare.

Gigartina pistillata	I have searched for this plant frequently but always unsuccessfully.
**Grateloupia filicina*	St. Michael's rock and Long rocks; plentiful but small.
Rytiphlæa complanata....	Land's-end.
Polysiphonia parasitica ...	Mount's-bay.
———— *thuyoides*	Mount's-bay.
———— *atro-rubescens.*	
*———— *Brodiæi*	Mousehole.
Dasya ocellata	Mount's-bay; rare.
**Cruoria pellita.*	
**Catenella opuntia.*	
**Bryopsis plumosa.*	
Codium tomentosum.	
Cladophora Brownii.....	Caves, Mousehole and Lamorna.
———— *uncialis*	St. Michael's Mount.
*———— *arcta.*	
**Conferva implexa.*	
*———— *melagonium*	Rare.
Lyngbya majuscula	St. Michael's Mount.
———— *speciosa*	Mount's-bay; rare.
*———— *Carmichaelii.*	
**Rivularia atra.*	
**Calothrix scopulorum*	
*———— *fasciculata*.....	Hayle.

* These *probably* occur also at Falmouth.

† The more delicate species of *Callithamnion* attain their full size and beauty only in well sheltered spots, and consequently the specimens gathered in Mount's-bay are usually inferior in beauty to those obtained at Falmouth.

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3. *Algæ* met with in both districts, but which it is desirable to mention, either to indicate more particularly their stations, or to make some remarks upon them :—

Lichina pygmæa & *L. confinis.*	Most botanists now regard these plants as *Lichens.*
Stilophora rhizodes.....	Mount's-bay; occasionally.
Punctaria latifolia	Marazion.
Asperococcus compressus	Long rocks; plentiful in spring
Ectocarpus brachiatus	Abundant.
* ———— *littoralis.*	
Myriotrichia filiformis	Common.
———— *clavæformis*	Rare; spring.
Mesogloia virescens	More frequent than *vermicularis.*
Callithamnion Brodiæi.....	Mousehole.
———— *Borreri*	Sennen cove.
———— *floridulum*	Sennen cove.

Gloiosiphonia capillaris	Mousehole.
Chondrus Norvegicus	Common.
Rytiphlæa fruticulosa	Penzance.
Polysiphonia spinulosa	Long rocks; very sparingly.
Dasya arbuscula	Land's-end; abundant.
Codium adhærens	Sennen cove.
Rivularia nitida	Long rocks.

* To the *Ectocarpus littoralis* of British botanists, J. G. Agardh, in his *Species Algarum*, gives the name of *Ectocarpus firmus*. He says that the true *E. littoralis* is confined to the Baltic, and describes it as allied to *E. brachiatus*, with opposite branches and roundish-oval fruit which is sessile on the ramuli.

On the remains of Druidical Temples near Penzance.

By RICHARD EDMONDS, Jun., Esq.

HAVING in former communications described the dwelling places, and tombs of the very ancient inhabitants of this neighbourhood, I will now speak of their Temples—those erections which consisted originally of nineteen detached stones, placed upright, from 3 to 5 feet above ground, in rude circles varying in diameter from 65 to 80 feet, and called by antiquarians "Druidical Temples," but by the neighbouring population "nine maidens," an abbreviation doubtless for "nineteen maidens." Borlase has noticed four of these within 5 miles of Penzance, all of which are still to be seen.*

The southernmost is the *Dawns Myin*,† in a field of Rosemoddress, in St. Buryan, a furlong or two S.W. of the two lofty pillars called the *Pipers*.‡ A public foot-path traverses the temple. Three of its nineteen pillars have fallen. The distances between those standing are generally about 11 or 12 feet measuring from the centre of one stone to the centre of the next: two of the

Antiq., p. 181.

† *Myin* is the plural of *maen* or *mên*, "stone," and is said to be the origin of our word *mine*.

‡ The *Pipers* were thus called most probably from their proximity to the *Dawns Myin*,—*dawns* signifying "dance"

intervals are nearly 14 feet each, and one nearly 21 feet. This will serve as a specimen of the irregular distances in which the pillars are placed in all these temples (see the plate). Besides the two large pillars called the *Pipers* (300 feet from each other, the one 15, and the other 13, feet above ground), there is another, within a quarter of a mile W. of the temple, 10 feet high. Borlase regarded such detached pillars as the stations of certain of the Druidical priesthood who had some service assigned them connected with the rites celebrated within. But I see no reason why they may not have been sepulchral monuments, particularly as the common feelings of our nature prompt us to have our places of interment as near as possible to our places of worship. It is moreover recorded by Hals that numerous barrows were destroyed near this temple about two centuries ago, each containing two or three urns with bones and ashes.*

The next circle is that of *Boscawen-ûn*, in a croft about three furlongs S. of the road to the Land's-end, and rather more than four miles W.S.W. from Penzance. It is traversed by a hedge of modern date. Mr. Cotton† imagined that this circle must have had originally twenty stones, besides the tall one in its centre, as two of them are so widely apart that the intervening space is nearly double the average distance. Had that author however carefully examined the other three circles he would have found that they all exhibited the same apparent defect, each having a space between two of its pillars much wider than that between any other two. This widest intervening space may have been for the entrance and exit of religious processions, or for bringing in and carrying out the victims. Three of these nineteen pillars have also fallen. There is a large pillar 8 feet high a furlong or two N.E. of this temple.

The *Tregaseal* circle is three or four furlongs S. of the top of Carn Kenidjack, in St. Just, on an open common, and five miles and a half from Penzance. The late Rev. John Buller, taking the smallest distance between the twelve pillars now standing as a

* See Davies Gilbert's Cornwall, vol. i., p. 141.

† Illustrations of Stone Circles, &c., in West Cornwall, (1827) p. 23.

measure, was of opinion that it must have consisted of twenty-one pillars: but I have carefully examined the spot, and in some of the intervals where he supposed stones had been erected, no sign whatever is observable of any having been there, the ground being hard and unbroken, and Borlase's assertion that they were only nineteen seems perfectly correct. Mr. Buller has described the much less perfect remains of another circle W. (by compass) from this—some of the stones being in a hedge, and the total number having been, as he considered, the same as that of the eastern circle: the circles are 120 feet from each other measuring from their centres: and the diameter of each "is from 60 to 70 feet."* Mr. Cotton however in his work already referred to (p. 26) states that both "are exact circles, 67 feet in diameter and the same distance apart in a line E. & W."

Broad granite slabs, from 3 to 6 feet long, each perforated with a hole of about 5 inches bore, have been also found near these temples. Four such stones, including a broken one, are lying on the common about a quarter of a mile E. of the *Tregaseal* temple, and another may be seen close to the *Dawns Myin*, towards the N., at the entrance of the field on the farther side of the road. In another field, eastward from the last mentioned temple, a similar stone is used for stopping a gap opening into the lane to Rosemoddress. These holed stones are supposed to have been used for securing the victims.

The circle of *Boskednan*, is on an open common between Ding Dong mine and Carn Galva, and 3¾ miles N.W. of Penzance. It has fewer stones remaining than either of the others, and is further distinguished from them by two of its pillars exceeding the rest very considerably in length, one of these being prostrate, and the other, which is next to it, still standing nearly 7 feet above ground (see the engraving). Near this temple are two or three large barrows or places of interment, whilst a small one is almost in contact with it.

These four temples are not the only ones in Britain wherein the number 19 stands so prominent. In Stonehenge, the inner oval

* Buller's St. Just (1842), p. 96.

immediately around the altar consists of precisely nineteen stones (see the plate in Dr. Stukeley's Stonehenge, p. 20). So, too, the temple of Classerniss, in the isle of Lewis, "called a heathen temple," consists of an avenue of nineteen stones on each side leading into the circle of twelve others.*

I will now cite a passage from Diodorus Siculus,† in support of the general opinion that these circles were temples of the sun. The passage begins with an apparent reference to Mount's-bay, the most southern and the mildest part of Great Britain, and the only place in this island considered to have been frequented by the ships of the Phœnicians and Greeks.—

"Amongst them that have written old stories much like fables Hecatæus and some others say that there is an island in the ocean over against Gaul (as big as Sicily) under the arctic pole where the Hyperboreans inhabit; so called because they lie beyond the breezes of the north wind—that the soil here is very rich, and very fruitful; and the climate temperate inasmuch as there are two crops in the year."

That Mount's-bay is the place alluded to by the Grecian author may be inferred from the fact of its still producing much earlier, and therefore more, crops in the year than any other part of Britain. But to proceed with the passage from Diodorus:—

"They say that Latona was born here, and therefore that they worship Apollo above all other gods; and because they are daily singing songs in praise of this god, and ascribing to him the highest honors, they say that these inhabitants demean themselves as if they were Apollo's priests, who has there a stately grove and renowned temple of a round form, beautified with many rich gifts: that there is a city likewise consecrated to this god, whose citizens are most of them harpers, who playing on the harp chant sacred hymns to Apollo in the Temple, setting forth his glorious acts." "The sovereignty of this city and the care of the temple (they say) belongs to the Boreades, the posterity of Boreas, who hold the principality by descent in a direct line from that ancestor."

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* Borlase's Antiq., p. 190.

† Book 2, chap. 3. Booth's Translation, p. 139.

The city and temple here referred to are supposed to have been those of Old Sarum and Stonehenge, and to have been erected under the superintendence of the Druids who came to Mount's-bay from Canaan in Tyrian ships, and were received as priests by the aborigines of this island. The Druidical temples, however, in the neighbourhood of Penzance, being of much ruder construction, and formed of unhewn* stones are considered still more ancient than that of Stonehenge, and to have been erected by Druids who had migrated from Canaan before the Jewish temple was built and when the Jews had only their tabernacle, the court of which where the victims were slain being, like our Druidical temples, all open to the sky, and inclosed by pillars placed at distances of 5 cubits, or about 9 feet, from each other, the object in each case being apparently to exclude all who were not especially engaged in the sacrifices, and at the same time to allow the people on the outside to behold what was transacting within—for the Jews believe that the victims were slain in sight of all the congregation, and as the court could not hold a tenth part of the congregation, it seems probable (Scripture being silent on the point) that the pillars from which the curtains (5 cubits in breadth) were suspended were like those of our Druidical temples, sufficiently low to allow the people to look over them. The circular forms of the latter might be traced to the worship of the sun. It is also to be observed that the Druidical priesthood resembled that of the Jews in being confined to the descendants of one man as recorded in the quotation.

The passage, after mentioning that the Hyperboreans used "their own natural language," and had "of long and ancient time a special kindness for the Grecians," concludes with the following statement:—"They say moreover that Apollo once in 19 years comes into the island, in which space of time the stars perform their courses and return to the same point and therefore the Greeks call the revolution of 19 years the Great Year."

This mythological reference to the cycle of nineteen years, at the end of which the new and full moons happen on the same days of the year as they did at the beginning, is very remarkable, for by it Christians have always ascertained the days of their

moveable festivals, and the Greeks adopted it for the like purpose in 433 B.C., Meton having obtained the first prize at the Olympic games for its discovery. Now Meton may have derived it through Hecatæus from Britain, as above mentioned, and the British Druids may have had it from the Jews, whose year in the time of Moses consisted, like our own, of 365 days, and whose great festival of the Passover was (like ours of Easter) regulated by the moon. It is, I imagine, to this cycle of nineteen years that the number 19, so prominent in our Druidical temples, refers.

Penzance,
4th Oct., 1850.

Notes on an Insect that proved injurious to the young Fruit Trees in the gardens at Pendrea.

BY A MEMBER OF THE SOCIETY.

IN the autumn and winter of last year, an old apple orchard, situated in the lowest portion of the grounds at Pendrea, was torn up for the purpose of re-planting. It was stocked with very old trees, and the ground had suffered but little disturbance for perhaps fifty years. The soil was loose, in some places stony, and all over covered with an accumulation of autumnal leaves. This spot was torn up and the trees removed in November, 1849. The re-planting was finished last March. On the northern, eastern, and southern boundaries a high stone wall is built for the training young fruit trees, while the western is sheltered by the hill of Pendrea. The trees, which consisted chiefly of pears, peaches, and plums, were very young. In April, when the first signs of vegetation were seen, the gardener observed that the peach and pear trees had, from some unknown cause, suffered very severely in their buds and younger branches. The depredations were watched with great interest, as they threatened the total destruction of every tree. For several days no cause could be assigned for it; but the gardener examining the localities by night, discovered a small brown beetle which issued by scores from the newly turned ground, and spread themselves along the trunks, branches, and buds, devouring the bark and leaves wherever they went. The pest was chiefly found on the wall with the southern aspect and the north part of the wall with a western aspect. The attacks were confined to the pears and peaches, while the plum was altogether untouched. This beetle, on examination, proved to be the apple weevil, *Curculio (Anthonomus) pomorum*, Fab. As this insect will sometimes destroy an entire apple crop, without the

farmer being at all aware of the cause of his loss, it may not perhaps be out of place here to state a few particulars relating to it. Our remarks are not intended for the scientific entomologist, who may be well acquainted with every particular mentioned, but for the distribution of useful information connected with natural history.

The apple weevil is a small brown beetle with a rather slight protruding snout, about the tenth of an inch long. Its wings are brown, and those of Pendrea were much lighter than usual, but had the darker and lighter transverse bands. Early in the spring, when the sap begins to flow, this insect issues from its winter retreat and searches out the apple buds, on which to pair. It always prefers the apple, but when these are absent, as in the case at Pendrea, it attacks the pear and peach, but not the plum.

The injury to the apple is frequently, and indeed most commonly, effected by the *grub*. The eggs are deposited during the spring in the buds, and by April they come to life and eat their way out. The best buds or blossoms are always selected and only one egg is placed in each. The deposition of the eggs in this way will continue for several weeks, but as soon as the bud begins to unfold no more are laid. The warmer the summer, and consequently the quicker the buds are unfolded, the less chance is there of injury. Of this many instances could be given, but our object is only to state the facts of the case. The larva can undergo its changes and become a beetle only in well sheltered habitations; for both rain and sunshine are alike destructive to it: hence, if the buds expand early, the grub is speedily killed. If, however, time be allowed for the full growth of the larva, and transformation to the beetle, the crop is sure to be destroyed.

These insects are said to be very shy, and during the autumn and winter they lie in the ground. In the spring they come up, and spread themselves over the trees, and from being very small they may escape detection; they adhere, however, very slightly, and a slight shake will bring them all to the ground.

As they were observed at Pendrea, they came up out of the ground at about nine or ten o'clock at night, and spread themselves over the trees till daylight, when they again retired. They chiefly

attacked the buds and young branches, but did not hesitate to feed on even the rough bark of the trunk. They devoured the buds and eat both the outer and inner barks, by pinching them up with their long probosces.

It is difficult to find a remedy for this pest when the trees are large. At Pendrea they were all small, and it was comparatively easy to pick the insects off and kill them. This was done by Mr. Bedford's gardener every night, till the end of May, and it has been so effectual, that at the present time the whole of the spot seems to be entirely free. But as a few of the eggs may have been placed in some of the buds and subsequently reared, it will be necessary to keep a strict watch during the next spring. In large orchards nothing but the most unremitting attention can save the crops in case of an attack. If sails or tarpaulings be placed under the trees, to receive them as they are shaken off, they may be destroyed, but it would be a hopeless task, we may say an impossible one, to examine every bud. Lime has been recommended, both as quick-lime and lime water. But how is it to be used? Tar has had its advocates; but the same difficulty applies, except among dwarf trees. The most effectual plan is shaking them off and killing them. To prevent a recurrence of their visit the ground should be cleared of loose stones, and leaves which may have fallen during the autumn, and this precaution will even more forcibly apply to loose fragments of bark and decaying branches. When once they have appeared, though they prefer the apple, yet they evince no dislike to the pear, so that in fact all the fruit trees should be carefully inspected from time to time.

Catalogue of Land and Fresh-water Shells, found in the neighbourhood of Nottingham.

By E. J. LOWE, Esq., F.R.A.S.,

MEMBER OF THE BRITISH METEOROLOGICAL SOCIETY, AND HON. MEMB. OF PENZANCE NATURAL HISTORY SOCIETY.

MARSH AND WATER SHELLS.

Alasmodon margaritiferous. Two young specimens, apparently of this shell, have been dredged from the river Trent near Beeston.

Ancylus fluviatiles, tolerably abundunt in clear dykes at Highfield House, Attenborough, Bulwell, and Oxton, and at the mouth of a well at Newstead Abbey.

——— *lacustris (Valletia lacustris* of Grey), tolerably abundant in a small ditch at Lenton, and in few numbers under the Seven Arches, in Nottingham Meadows.

Anodon cygneus, abundant in the lake at Highfield House, in the old Trent at Sawley, and in the mill-dams at Bulwell.

——————— *var.* of *contorta,* rare in the lake at Highfield House.

——— *var.* of *cellensis,* abundant in the lake at Highfield House, and very large in the river Trent, near Beeston.

——— *var.* of *Anatina,* abundant in the lake at Highfield House, a stream and canal at Lenton, and the rivers Trent and Soar.

——— *var.* of *Avonensis,* rare in the river Trent, near Beeston.

——— *var.* of *Anatina,* which is very ventricose, found in the lake at Highfield House.

Bithinia tentaculata, exceedingly common at Lenton, abundant at Beeston, Attenborough, and under the Seven Arches in the Nottingham meadows, and in the river Trent at Beeston and Sawley.

Bithinia ventricosa, rarè in a dyke at Lenton, and under the Seven Arches in Nottingham meadows.

Cyclas cornea, very common in the river Trent at Beeston, and in brooks at Lenton, Beeston, Attenborough, Bulwell, and Highfield House, and under the Seven Arches in Nottingham meadows.

——— *lacustris*, very abundant in a brook at Beeston, and in another at Highfield House.

——— *rivicola*, rather abundant in the river Trent, near Beeston, and river Soar at Thrumpton.

Dreissena polymorpha, very common and large in the lake at Highfield House, also common in the canal at Lenton, the river Soar at Thrumpton, a pond at Wollaton, and in few numbers in the river Trent, near Beeston.

Lymnœa auricularia, abundant at Lenton, Beeston, Attenborough, and Sawley.

——— *minuta*, abundant in pools on Mapperly plains, common in a dyke at Highfield House, and very abundant at Sawley.

——— *palustris*, abundant on moist mud at Sawley, and near the railway at Thrumpton, and very large in a ditch between Beeston and Attenborough, near the river Trent.

——— *pereger*, very common at Lenton, Beeston, Attenborough, Sawley, Bulwell, Thrumpton, Highfield House, and Nottingham meadows.

——— *truncatulus*, rare in a ditch at Lenton, and under the Seven Arches, in Nottingham meadows.

——— *stagnalis*, abundant in a dyke at Lenton, a dyke at Attenborough, a mill-dam at Bulwell, a back-water at Sawley (called the old Trent), and in few numbers in the river Trent at Beeston, and a dyke between Beeston and Attenborough.

Neritina fluviatilis, abundant in the river Trent at Beeston, and the river Soar at Thrumpton.

Paludina Achatina, common in the river Trent, below Nottingham, the river Soar at Thrumpton, and the canal at Lenton.

Physa acuta (of Sowerby), very abundant in the river Trent at Beeston and Attenborough, rare in a brook on Oxton bogs, in the canal at Lenton, and in a ditch between Beeston and Attenborough.

Physa fontinalis, abundant in dykes at Lenton and Attenborough, and in a pond at Wollaton.

——— *hypnorum* (*Aplexus hypnorum* of Grey), abundant in a dyke at Beeston, and in few numbers in a ditch between Beeston railway station and the river Trent.

Pisidium amnicum, abundant in the river Trent at Beeston, and a ditch near the Beeston railway station.

——— *pusillum*, near Beeston.

——— *cinereum*. Mr. Jeffreys found it in Clumber lake.

——— *obtusale*, rare in a dyke near Beeston railway station.

——— *nitidum*. Mr. Jeffreys found it in Clumber lake.

——— *pulchellum*, rare near Beeston.

——— *Henslowiana*, very rare in a ditch near the Beeston railway station.

Planorbis albus, in few numbers in the river Trent near Beeston.

——— *carinatus*, very abundant in dykes at Beeston, Lenton, Attenborough, and Bulwell, in the river Trent near Beeston, and under the Seven Arches in Nottingham meadows.

——— *contortus*, not common, in bogs at Bulwell, and in a brook at Lenton.

——— *corneus*, very abundant in dykes at Lenton, Beeston, Bulwell, Sawley, and between Beeston and Attenborough.

——— *imbricatus*, not uncommon on dead leaves in the lake at Highfield House.

——— *marginatus*, abundant in dykes at Beeston, and of large size in a dyke between Beeston and Attenborough.

——— *nitidus*, rare in the lake at Highfield House, and a pond at Wollaton.

——— *spirorbis*, found in dykes at Beeston, Lenton, and Attenborough, and in the river Trent near Beeston.

——— *vortex*, very abundant in the river Trent, and in dykes at Beeston, Lenton, Attenborough, and under the Seven Arches in Nottingham meadows.

Succinea Pfiefferi, common at Sawley, and near Highfield House.

——— *putris*, abundant at Thrumpton.

Unio pictorum, common in the lake at Highfield House, the river Trent at Beeston and Sawley, and the river Soar at Thrumpton.

Unio var. of *Deshaysii*, not common, in the river Trent near Beeston.

—— *ovalis*, found in the lake at Highfield House, and the river Trent near Beeston.

—— *var.* of *rostrata*, rare in the river Trent near Beeston.

—— *tumidus*, not uncommon in the river Trent near Beeston, and found in the lake at Highfield House.

Valvata cristata, rare on the bogs at Bulwell, and at Beeston.

——— *piscinalis*, common in dykes at Beeston, Lenton, and Bulwell, and found in the river Trent at Beeston.

LAND SHELLS.

Achatina acicula, rare near Holme piere-pont; authority the Rev. J. Peach.

Azeca tridens, in few numbers at Highfield House.

Balœa perversa, rare at Thrumpton.

Bulimus obscurus, abundant at Nottingham Castle, and at Highfield House.

——— *lubricus* (*Zua lubrica* of Grey), common at Highfield House, Sawley, and Thrumpton, and found at Bulwell, Oxton, and Stanton on the Wolds.

Carycium minimum, tolerably abundant under leaves at Highfield House, Bulwell, Stanton on the Wolds, and at Beeston.

Clausilia nigricans, exceedingly common at Thrumpton, Bulwell, and Highfield House.

Helix aculeata, rare at Stanton on the Wolds, and tolerably abundant at Highfield House under decayed leaves.

—— *alliaria*, not abundant under stones at Sawley and Thrumpton.

—— *arbustorum*, rare at Thrumpton, Sawley, and Highfield House.

—— *aspersa*, very common at Beeston, and round Nottingham.

—— *caperata*, very abundant in a field at Stanton on the Wolds.

—— *cellaria* (*Zonites cellarius* of Grey), abundant at Nottingham Castle, Sawley, and Highfield House. In a rock cellar belonging to G. Allcock, Esq., Parliament Street, Nottingham, they attain a great size.

Helix concinna, tolerably abundant at Highfield House, and found also at Stanton on the Wolds.

—— *crystallina (Zonites crystallinus* of Grey), not abundant, at Highfield House, Bulwell, and Oxton.

—— *depilata,* in small numbers at Stanton on the Wolds.

—— *ericetorum,* abundant at Stanton on the Wolds.

—— *fulva,* not uncommon at the foot of a hill at Thrompton, rare at Highfield House, on Oxton bogs, and at Stanton on the Wolds.

—— *granulata,* rare at Bulwell.

—— *hispida,* tolerably abundant at Highfield House, Beeston, Bulwell, Oxton, Nottingham Castle, Stanton on the Wolds, Sawley, and Thrumpton.

—— *hortensis,* rare at Bulwell.

—— *hybrida,* rare at Highfield House.

—— *lucida (Zonites lucidus* of Grey), not common, at Bulwell, Highfield House, Stanton, and Oxton.

—— *nemoralis,* common at Highfield House, Beeston, Thrumpton, and Sawley.

—— *nitidula (Zonites nitidulus* of Grey), rare at Bulwell and Oxton.

—— *pulchella,* tolerably abundant at Highfield House, rare at Oxton and Beeston.

—— —— *var.* of *crenella,* at Highfield House.

—— *pura (Zonites purus* of Grey), rare at Oxton.

—— *pygmœa (Zonites pygmeus* of Grey), rare at Highfield House and Stanton on the Wolds.

—— *rotundata (Zonites rotundatus* of Grey), common at Highfield House, Bulwell, and Nottingham Castle.

—— *sericea,* rare at Bulwell, Oxton, and Stanton on the Wolds.

—— *virgata,* rare at Highfield House.

Pupa umbilicata, common at Nottingham Castle, and Highfield House.

Vitrina pellucida, common at Oxton, not abundant at Beeston, Bulwell, Highfield House, and Stanton.

In the above Catalogue, where the nomenclature of Grey has not been followed, Grey's names are also given to prevent confusion.

Although this list contains no less than 51 water shells and 34 land shells, I cannot pretend to say that these are the only shells found in the immediate vicinity of Nottingham, for my search was only commenced in April last, and there are many localities which I have yet to visit which will doubtless yield more species not at present contained in my catalogue.

As it is desirable that catalogues should be published from various parts of the country, and as Nottingham has not hitherto, to my knowledge, boasted of a catalogue of its land and fresh-water *Mollusca*, I have determined upon presenting your Society with the result of my labours on this very interesting branch of natural history, and on some future occasion hope to continue the subject by some remarks on the habits and various interesting features which I have noticed in British *Molluscs*.

Highfield House, near Nottingham,
September 19th, 1850.

Remarks on a specimen of the Pike-headed Whale (Balœnoptera rostrata), *taken near Polperro, May 8th.*, 1850.

By JONATHAN COUCH, Esq., F. L. S., Etc.,

MEMBER OF THE SOCIETY.

THE capture of a specimen of one of the larger kinds of whales is of such rare occurrence, and our knowledge of the particular species frequenting our coasts so imperfect, that it becomes highly desirable to examine closely every specimen that comes within our reach.

And for this purpose the instance which has lately come within my observation has afforded a great advantage, from the small size of the specimen in comparison with the enormous bulk to which some of them attain. As it floated before me I was enabled to get it turned in every direction, and to examine it at my leisure, with the help of the men who had caught it, and who showed a disposition to render me all the assistance in their power. It may be ascribed to the want of such help, and the consequent difficulty of making a satisfactory examination, by taking a view of the whole subject at once, that so much obscurity continues to hang over our knowledge of the appropriate figure and characters of the British whales.

On the 8th of May, 1850, the specimen now described became entangled in the mackarel drift-nets of a boat belonging to Polperro; and as it was held fast both by the head and tail, its drowning seems to have been easily effected; the fishermen did not appear to have been sensible of any violent motion, and not a mesh of their nets was broken. It was towed into the harbour soon after its capture; and that I might examine it the more correctly the creature was placed in such a manner as to afford me a favourable view of its form, for the purpose of obtaining a sketch, and measuring it in all directions.

When the drawing was so far advanced as to form a tolerable likeness, I also had an opportunity of comparing it with the creature as it lay on the beach, and thus of correcting the more minute markings. These observations are introduced to show that no care has been omitted to render my figure and description as exact as possible.

The length of this specimen was 14 feet 6 inches, and consequently I suppose it to be scarcely above the second year of its age; for the species sometimes reaches to the length of 20, or even 30 feet. A line passed round the body, where stoutest, measured 7 feet 8 inches: from the eye to the end of the under jaw 3 feet: pectoral fin, 2 feet long, rather narrow, pointed: breadth of the tail, across at the lunations, 3 feet 9 inches: greatest longitudinal extent of the tail, 1 foot: from the end of the tail to the dorsal fin, about 4 feet. Blow-holes in front of a line passing from eye to eye, two in number; the orifices straight, rather converging, separated by a central depression or chink, on each side of which is a ridge. Under jaws capable of being opened very widely, rounded in front; the gape passing back under the eye, and a channel, or excavation, continued obliquely downward beyond the angle of the mouth, on the cheek. The baleine, or whalebone, shortest in front, passing from 3 or 4, to 5 or 6 inches long; when I first saw it, flesh coloured, but afterwards becoming yellowish, principally, I suppose, from the death of the animal. Roof of the mouth convex and smooth; tongue of very loose texture, and appearing as if folded in a lax manner in the mouth,—resembling a quantity of cloth loosely folded and thrown into the space, which was capable of holding a great quantity. The proper upper surface of the tongue appeared limited, with a defined edge; but this organ seems capable of extensive action of some characteristic kind connected with the collection of its food. The visible portion of the eye is small, and sunk between four raised longitudinal folds of integument, beneath which, on dissection, appeared some slight marks of muscular structure. When extracted, the eye-ball was found to be as big as a large orange, and therefore in size disproportioned to the breadth of the transparent cornea, which cannot admit of extensive sight—however accurate it may be.

In form this creature is but little elevated from the snout to near the tail; but it is rounded over the back, and ridged posteriorly. Across the head, at the eyes, it is almost flat, and slightly elevated in front of the blow-holes: behind the dorsal fin declining, and rapidly so as it nears the tail. Dorsal fin hook-shaped, and pointed; but I suppose, from the descriptions I have received from fishermen, that it is lower and blunter in old animals. The thoracic folds, which form a distinguishing character in this genus of whales, begin at a short distance from the ramus of the lower jaw; but in the specimen now under examination they did not run back far behind the termitation of the pectoral fins, and behind this the abdomen was smooth. These folds were 27 or 28 in number on each side, counting from the middle, where they were shorter. They gradually became longer, and then again grew shorter at the sides.

Colour of the back and upper portion of the sides, a fine black, with a mark of a darker cast anteriorly,—resembling a saddle: colour below, a beautiful resplendent white,—resembling satin. Pectoral fins, black at their origin and termination, with a defined white space between them. This mark is represented in Mr. Bell's figure (British Quadrupeds, p. 521),which bears a nearer likeness to the specimen I have described than the one at the head of his "History of the Rorqual"; but he represents the longitudinal folds as running the length of the abdomen, whereas in this instance they did not extend to half that length. There can be no doubt that these folds are fitted to allow of great occasional expansion, and therefore the difference in their extent may be a sexual distinction. When closely folded, the concealed surface becomes crenate, but they are simply contractile, having no muscular structure. The blubber where thickest, was about 2 inches in depth, and yielded about 20 gallons of oil. Nothing was found in the stomach.

It may be worth mentioning, that at various places on the skin there were creatures of a thread-like form, which had pierced through the integument, and hung from it like so many threads of cotton. These parasitic worms appeared to be feeding on the blubber; but they might, on cursory examination, have been mistaken for hairs, and this circumstance may help to explain some

remarks of the older naturalists concerning these animals. The cuticule of this whale was of the utmost fineness.

British authors have written with so much uncertainty on the different kinds of whales that it is exceedingly difficult to assign to the seperate species the synonyms as they appear in the works of Fleming, Bell, and Jenyns,—which are the books usually consulted on the kindred departments of natural history. Mr. Bell has not distinguished the mighty Rorquahl from this smaller species; but the figure he has given at page 521 of his History of British Quadrupeds, and which is copied from Hunter, may be accepted as a sufficient representation of the kind now under consideration. Pennant also notices it; and it is also referred to in Mr. Gray's catalogue of the whales in the British Museum, page 32. The lower jaw is also well represented by the same gentleman in pl. 2 of the Zoology of the Voyage of H. M. Ships Erebus and Terror. Both Fleming and Jenyns confound this species with the *B. Musculus* and *Boöps;* both of which, after a very attentive inquiry, are believed by Mr. Gray to constitute one kind, distinct from the *B. rostrata* of Hunter and Pennant.

Polperro,
May 26th, 1850.

A List of British Birds, as a guide to the Ornithology of Cornwall, especially in the Land's-end district; with remarks on the capture, habits, &c., of some of the rarer species.

By EDWARD HEARLE RODD, Esq.,

one of the secretaries.

THE following, although a general list of British Birds, is intended to shew a statistical summary of the species at present included in the Cornish Fauna. There are so many valuable works on British Ornithology, giving in detail accurate descriptions of the plumage, dimensions, and habits of our British Birds, and explaining their generic and specific characters, that it would be useless to repeat such descriptions, or indeed to add remarks, except where particular circumstances admit of so doing, namely, in reference to the rarity of the species, the peculiarity and locality of its capture, or the variety in form, colour, and dimensions which individuals have exhibited.

This list is furnished in accordance with a promise made at the last annual meeting of the Society.

Raptores.

Egyptian Vulture, *Neophron percnopterus*, not Cornish; very rare: one only recorded as British, shot near Clive in Somerset.

Spotted Eagle, *Aquila nævia*, not Cornish: a newly discovered species, shot in Ireland in 1845. See Yarrell's Sup. Recent examples,—Youghall, Cork, 1845; Killarney, 1846.

Golden Eagle, *A. chrysaetos*, no recorded Cornish example. In England, rare; more exclusively confined to Scotland.

White-tailed Eagle, *A. albicilla*, Cornish; sometimes seen on the sea coast: the last specimen, on the authority of the

Rev. John Davis, of Kilkhampton, was killed at Cornekay, in the parish of Kilkhampton, Nov. 9th, 1844:—weight 10lbs., length, 3 feet 1 inch, breadth, 7 feet 6 inches. One seen a few years since at Skewjack, in Sennen.

Osprey, *Pandion Haliœetus,* Cornish; several examples obtained, although at uncertain intervals: generally observed in estuaries, —Helford, &c. One example killed at Scilly, in Sep., 1849. Said to breed at the Lizard; but no instance authenticated. Found occasionally in most of the English counties.

Gyr Falcon, *Falco Islandicus,* Cornish; very rare in the southern parts of England: one killed at the Lizard, another at Port Elliot, in St. Germans,—the former is in the museum of Mr. Magor, of Penventon.

Peregrine Falcon, *F. peregrinus,* Cornish; not uncommon, and in different states of plumage: breeds annually on the Morvah cliffs; specimens obtained from thence and Trengwainton in adult and immature plumage: observed near Trewavas cliff, in Breage. Adult specimens, of both sexes, have the back light blue: the male bird much smaller than the female.

Hobby, *F. subbuteo,* Cornish; rare: summer visiter. One killed by the gamekeeper at Trebartha, on the Bodmin moors, a few years since; another at Greston wood, near Launceston.

Red-footed Falcon, *F. rufipes,* not Cornish; British; rare: first record of its capture, 1830, when four were killed in Norfolk. Recent example,—Selby, 1844.

Merlin, *F. Æsalon,* Cornish; winter visiter; not uncommon: specimens obtained from Madron and Gulval. Frequents the outskirts of moors, bordering on cultivated land. The old male with a light blue back is the Stone Falcon of Bewick.

Kestrel, *F. tinnunculus,* Cornish; generally distributed, and the best known of all our smaller hawks from its stationary and fanning action in the air.

Goshawk, *Accipiter palumbarius,* not Cornish; British: principally confined to the north of England, and Scotland. Recent examples,—Yarmouth, 1844; Norwich, 1850.

Sparrow-hawk, *A. nisus,* Cornish; generally distributed: the female of this species is at least one third larger than the male.

Kite, *Milvus furcatus*, Cornish: no recent example. This species has been almost exterminated in the west of England: two examples in the Truro museum of the Cornish Institution, labelled as Cornish.

Swallow-tailed Kite, *Elanus furcatus*, not Cornish; very rare as a British bird: two recorded specimens only.

Common Buzzard, *Buteo vulgaris*, Cornish; the most common of the larger *Raptores*, and a well known species: may be seen on most days on our high hills, especially at Zennor and Towednack, sailing at a great height, in large circles, with almost motionless wing; they exhibit an interesting and wild appearance whilst thus soaring at a great elevation. This species is remarkable for the variation in the light and dark hues of its plumage. It is generally considered that the uniform deep brown plumage is a sign of youth, more or less white appearing in the under parts as the bird approaches maturity.

Rough-legged Buzzard, *B. lagopus*, Cornish; not observed in the western district, but once seen on Bodmin moors: nowhere common, although one or more specimens have been obtained in nearly every county.

Honey Buzzard, *B. apivorus*, not Cornish; most frequently met with in the counties on the east coast of England. This species is remarkable for having the lore covered with small feathers, which in the other *Raptores* is nearly bare.

Marsh Harrier, *Circus rufus*, Cornish; rare throughout the whole county: a few specimens have been procured from this neighbourhood: viz.,—the Land's-end, Boswharton moor, and Lemorna; but the species appears to be more rare every year.

Common Harrier, *C. cyaneus*, Cornish; not a numerous species: a proportion of 4–5ths of the examples captured have been in the "ringtail" or brown plumage. The ringtail is the female of this species, and the young males exhibit the female tints till the second or third year.

Montagu's Harrier, *C. cineraceus*, Cornish; rare: an adult female was obtained from Madron, and another from one of the western parishes: an adult male from Trelaske, in the

eastern part of the county. There are four distinctions in this bird from the last: viz.,—its inferiority of size; the black bars on the secondary feathers of the wing of the male; greater length of wing; and in the under parts of the adult male having longitudinal rufous streaks, whilst the adult female has the under parts of an uniform rufous brown,—characters not observable in the Common Harrier.

Eagle Owl, *Buteo maximus*, not Cornish; habitat,—Scotland and the Northern Isles.

Scops-eared Owl, *Scops aldrovandi*, Cornish; Scilly Isles. The only instance of the occurrence of this small owl in Cornwall was at Scilly, in April, 1847. This species exhibits the most delicate pencillings of grey and brown in its plumage, surpassing the much admired plumage of the wryneck and nightjar in these particulars: it is said to be the smallest species of British owl.

Long-eared Owl, *Otus vulgaris*, Cornish. Several instances of the occurrence of this bird have been recorded in the neighbourhood of Penzance,—two from Trengwainton recently, and one from Trevethow.

Short-eared Owl, *O. brachyotus*, Cornish; winter visitant: appears in October: generally found in the heath covert, and furze on the sides of hills, also in turnip fields, and not unfrequently several together.

White Owl, *Strix flammea*, Cornish; rather rare in the western part of Cornwall, but more numerous in the eastern part.

Tawny Owl, *Syrnium aluco*, Cornish; generally distributed where any woodland districts offer shelter.

Snowy Owl, *Surnia nyctea*, not Cornish: habitat,–north of Scotland and Scottish Isles, and occasionally in the northern counties of England; but a rare British bird. Recent example,—Beeston, Norfolk, 1850.

Hawk Owl, *S. funerea*, Cornish. The only recorded British example of this owl was taken on board a collier, a few miles off the coast of Cornwall, in March, 1830, in an exhausted state. See Yarrell's British Birds, p. 139. A second example of this rare owl is recorded in the Zoologist for February, 1850,

from the pen of E. T. Higgins, who says it was shot on the 25th of August, 1847, on Blackwall hill, near the Bristol and Exeter Railway, and came under his observation on the following day.

Little Owl, *Noctua passerina*, Cornish; rare: one obtained near Helston, and now in the collection of J. P. Magor, Esq., of Redruth: two are recorded to have been taken near Plymouth. Natural habitat,—Germany, Italy, Spain, Levant, &c.

Tengmalm's Owl, *N. Tengmalmi*, not Cornish; rare: fewer instances are recorded of its occurrence in England than the former. Habitat, — North America, Norway, Sweden, Russia, &c. Recent examples, — Hummanley, Yorkshire, 1850; Marsden, Durham, 1850.

INSESSORES.

Great Grey Shrike, *Lanius excubitor*, Cornish; rare: occasional visitant in some parts of England, and generally, though not always, in the winter. One killed at Gweek.

Great Northern Shrike. A supposed new British species. Recent examples,—see Zoologist, 1850; Knaresborough, Warwickshire, 1850.

Red-backed Shrike, *L. collurio*, Cornish; Trembath, Madron, and The Minney; nest and eggs procured from these localities: summer visitant, not numerous, and at uncertain intervals; nest large for the size of the bird.

Woodchat Shrike, *L. rufus*, Cornish; very rare: an adult bird caught in a boat, near Scilly. In the autumn of 1849 several examples of the young of the year were captured on the Scilly Isles, apparently driven there by a strong east wind which intercepted their migratorial movement southwards: this may be regarded as an important fact, as offering good grounds for believing that they were bred in the British Isles, —a fact quite new to science, the species itself being, until very recently, not included in the British Fauna.

Spotted Flycatcher, *Muscicapa grisola*, Cornish; generally distributed in the summer months, especially in east Cornwall.

Pied Flycatcher, *Muscicapa luctuosa*, Cornish; not recorded as

a Cornish species till the autumn of 1849, when one was captured at Alverton, Penzance; others have since been taken at Scilly, under the same circumstances as the woodchat.

Common Dipper, *Cinclus aquaticus*, Cornish; east Cornwall: frequents rocky mountain streams: breeds on the banks of the Lynher, at North-hill. The shape and position of the nest is very similar to that of our common wren.

Missel Thrush, *Merula viscivorus*, Cornish; generally distributed.

Rock Thrush, *Petrocincla saxatilis*, not Cornish; a newly discovered species in England, and added to our Fauna by Mr. Yarrell in his Supplement to his British Birds: one specimen killed at Thurfield, near Royston; another specimen shot by a gamekeeper in England. Inhabits the wild mountainous countries in the centre of Europe.

White's Thrush, *Turdus Whitei*, not Cornish. The habits of this very rare British bird (two examples of which are only recorded as British) are little known.

Gold-vented Thrush, *T. aurigasta*, not Cornish. This is a new species added to the Catalogue of British Birds by Mr. Yarrell, in his Supplement to the British Birds, in consequence of an example having been obtained from the neighbourhood of Waterford, in the month of January, 1838. This species is said to be found in the Caffre country.

Fieldfare, *Merula pilaris*, Cornish; winter visitant: after severe frost there is always a great accession of numbers throughout this and the western counties, from their retreating as far southward and westward as possible for a less rigorous climate; a short duration of severe frost appears to prostrate the powers of this and the following species. Universally distributed.

Redwing, *M. iliaca*, Cornish; winter visitant. See previous remarks on the fieldfare. Universally distributed.

Song Thrush, *M. musica*, Cornish; generally distributed.

Blackbird, *M. vulgaris*, Cornish; generally distributed.

Ring Ouzle, *M. torquata*, Cornish; summer visitant: rare, but sometimes seen on the wild open country about Zennor, Towednack, &c. Carn Galva is a locality exactly congenial to the habits of this bird, where it has been seen. More common

on the eastern moors, where they breed. The young, scarcely fledged, have been observed and taken on the moors and tors near North-hill: viz.—Hawk's Tor, Kilmar, &c.

Golden Oriole, *Oriolus galbula*, Cornish; Sennen. Two adult male specimens have been obtained, and a female taken in a boat, by a fisherman, near the Land's-end:-Mr. Trembath, of Mayon House, possesses one, and Mr. Magor, of Redruth, the other, and also the female. A bird, apparently of this species, was observed a short time since at Scilly, but not identified. Recent examples,—nest found, Kent, 1845; Yarmouth, 1850; Elmstone, Kent, 1849, 1850; Leyton, 1850.

Alpine Accentor, *Accentor Alpinus*, not Cornish; very rare: recent example,—Teignmouth, 1844.

Hedge Accentor, *A. modularis*, Cornish; generally distributed: song continued throughout the winter in mild open weather.

Redbreast, *Erythaca rubicola*, Cornish; generally distributed.

Blue-throated Warbler, *Phœnicura suetica*, not Cornish; very rare.

Redstart, *P. ruticilla*, Cornish; very rare westward of Exeter. First discovered in Cornwall in Trebartha woods, in the parish of North-hill: nest and eggs also found and secured, and specimens of the bird.

Black Redstart, *P. Tithys*, Cornish; not uncommon in the winter months in immature plumage: frequents stone hedges, stone walls by the side of roads, and appears to prefer open ground to bushes and trees.

Stonechat, *Saxicola rubicola*, Cornish; generally distributed.

Whinchat, *S. rubetra*, Cornish; rare and local: eastern moors; occasionally in the neighbourhood of Penzance,—on the open downs near Castle-an-Dinas.

Wheatear, *S. œnanthe*, Cornish; summer visitant, and generally distributed over the less cultivated parts of the country, on stone hedges, &c.

Grasshopper Warbler, *Salicaria locustella*, Cornish; summer visitant; by no means numerous: one or two generally heard every summer in Alverton fields, Madron bottom, and a few other localities: song resembling the notes of a cricket, but uttered with rapidity and continuously, apparently with

one breath, and with trilling expression. The habits of this species are retired and obscure, and from its constantly frequenting the most dense part of brambly hedge rows, it is seldom seen. Sings throughout the night, and in still summer nights may be heard at a considerable distance, although the note is in itself weak.

Sedge Warbler, *S. phragmites,* Cornish; summer visitant; generally distributed: frequents wet ditches, willow plots, &c., and sings both in the day and night: when concealed in cover it is stationary, but when in open hedges continually moving about.

Savi's Warbler, *S. luscinoides,* not Cornish; rare, and only known as British recently. See Gould, Yarrell, &c.

Reed Warbler, *S. arundinacea,* Cornish: several captured at Scilly, with other summer migrants, in the autumn of 1849 (see woodchat, shrike); not known as Cornish until then. Very rare in the western counties; and altogether as a British bird much more rare and local than the sedge warbler; and distinguished from the sedge warbler by the absence of a line over the eye, and from the uniform brown colour of its back, without dark spots.

Nightingale, *Philomela luscinea,* not Cornish; summer visitant: northern limit, about Doncaster; western limit, the extreme east of Devonshire.

Blackcap Warbler, *Curruca atricapilla,* Cornish; local: summer visitant, but at irregular intervals. Occasionally observed in Gulval and Lariggan valleys, and at Trereife; in the eastern parts of the county very generally distributed. Song sweet, wild, and full. As the summer advances the song is then less interrupted, louder, and far more remarkable for variety of expression: when continued thus unbroken the song is one of the most attractive of our smaller song birds.

Garden Warbler, *C. hortensis,* Cornish; summer visitant: eastern parts of the county. One only recorded as seen about Penzance, although several specimens were obtained, along with other of our summer migrants, from Scilly, in the autumn of 1849.—See pied flycatcher, reed wren, &c. This species

breeds annually in the woods at Trebartha, in North-hill, from whence specimens of its nest and eggs have been received. Its habits, food, song, nest, and eggs, and general character approach very near the former species:—song rather more hurried, and sometimes garrulous in expression, but the quality of voice quite equal, and the tones deeper, some of its notes resembling the blackbird's song:—nest generally placed loosely in the middle of a bramble bush, in a ditch, particularly where nettles offer concealment in the bush.

Whitethroat, *C. cinerea*, Cornish; summer visitant: commonly distributed. The inferiority of song in this species is very remarkable when its similarity and alliance to the two former are considered.

Lesser Whitethroat, *C. garrula*, not Cornish; summer visitant: not uncommon in some of the eastern counties, especially about London.

Wood Warbler, *Sylvia sibilatrix*, Cornish; summer visitant: very common in several localities in the eastern parts of the county, viz:—Trebartha woods, where it breeds annually: not known in the western district. This bird possesses two varieties of song, quite different from each other: the first, and the most usual, is the rapid jarring trill, from which it derives its Latin name; the second is a low whining, plaintive call, repeated two or three times, at uncertain intervals, resembling the words "chea," "chea," "chea."

Willow Warbler, *S. trochilus*, Cornish; summer visitant: rather local, but where found, common.

Chiff-chaff, *S. hippolais*, Cornish; summer visitant: generally distributed. Some few remain throughout most winters, and have been heard chirping, in mild open weather, in December and January.

Dartford Warbler, *Melizophilus provincialis*, Cornish; summer visitant; rare. No very satisfactory record exists of the capture of this small warbler, although it has been seen in some furzy ground in the parish of Madron.

Dalmatian Regulus, *Regulus modestus*, not Cornish; very rare: a single instance only of its capture in England existing, and one other shot in Dalmatia, forming its known history.

Gold-crested Regulus, *R. cristatus*, Cornish; generally distributed.

Fire-crested Regulus, *R. ignicapillus*, Cornish; Penzance, Gwennap, Truro; very rare. One caught at the Minney, Lariggan; two others found dead together in the grounds of Michael Williams, Esq., at Trevince, and others near Truro. First notice of its capture in England, 1832. Recent examples,—Yarmouth, 1849; three at Truro, 1847; Rye, 1849; Knaresborough, 1850; Lewes, 1850. Killed in December.

Great Tit, *Parus major*, Cornish; generally distributed. This bird possesses, like all the species of Titmouse, great variety of notes, several of them resembling exactly the sound produced by the sharpening of a saw: it utters two or three loud chirps at the commencement of spring, like the "twink twink" of the chaffinch.

Blue Tit, *P. cæruleus*, Cornish; generally distributed.

Crested Tit, *P. cristatus*, not Cornish; frequents the large pine forests in Scotland: very rare in England. Recent example,—Sunderland, 1850.

Cole Tit, *P. ater*, Cornish; not uncommon in woods, especially in the eastern parts of Cornwall.

Marsh Tit, *P. palustris*, Cornish; not uncommon in large woodlands in east Cornwall; rare in the west: generally frequents low copses, alder pollards, and withy coverts, in morasses: less numerous than the last species.

Long-tailed Tit, *P. caudatus*, Cornish; rather local: found in small families throughout the winter, perhaps the brood of the former year.

Bearded Tit, *Calamophilus biarmicus*, Cornish; very rare: St. Levan, the only recorded Cornish example. Frequents the reed marshes on the banks of the Thames. One of the most beautiful of our smaller birds.

Bohemian Waxwing, *Bombycilla garrula*, Cornish; occasional winter visitant: a flight, which spread more or less over the whole of Great Britain, took place in the winter of 1849–1850.

Pied Wagtail, *Motacilla Yarrellii*, Cornish; generally distributed.

Continental Pied Wagtail, *M. alba*, Cornish; not uncommon in the spring months: easily recognized in the summer months

by its light grey back, which in the common pied species is always more or less black. Falmouth, Gulval, Marazion Green, &c.

Grey Wagtail, *M. boarula*, Cornish; winter visitant in the south of England: generally distributed. Some few remain throughout the summer in Cornwall, and breed: throat, in summer, black.

Grey-headed Wagtail, *M. neglecta*, Cornish; rare: Marazion Green. Generally observed, on their first arrival, with the yellow wagtail.

Ray's Wagtail, *M. flava*, Cornish: seen for a few days on their first arrival, and again in the autumn, on their return:—Marazion Green.

Tree Pipit, *Anthus arboreus*, Cornish; summer visitant: very common in the eastern parts of the county, in the summer months; rare in west Cornwall: one killed near Pleming, in Gulval. Generally observed in large trees, in open fields and parks, from whence the bird mounts singing, returning generally to the same tree, or a contiguous one. Song louder and very superior in quality to the titlark.

Meadow Pipit, *A. pratensis*, Cornish; generally distributed over cultivated and uncultivated land.

Rock Pipit, *A. aquaticus*, Cornish; generally distributed on our rocky beaches.

Richards' Pipit, *A. Richardi* (length 7½, not 6¾ ins.: see Yarrell), Cornish; rare: several examples killed in Redinnick fields, Penzance, a few years since, but not since observed.

Shore Lark, *Alauda alpestris*, not Cornish; very rare: two or three examples only recorded as having been captured in Britain. Recent example,—Yarmouth, 1850.

Sky Lark, *A. arvensis*, Cornish; generally distributed.

Crested Lark, *A. cristata*, Cornish. The discovery of this species in this district took place at about the period of the publication of the supplemental number to Yarrell's History of Birds, the bird not having been recognized as British at the time of the publication of his work. Two examples were obtained in September, 1846, from the road side between this place and

Marazion. Attention was drawn to the birds by the melodious character of their chirp, resembling more in character the flute-like tones of the wood lark, than the buoyant song of our common sky lark. The form of the beak, and the comparative shortness of the hind claw in the new species, are decided characters. Another specimen was observed and subsequently secured by Mr. J. N. R. Millett, of this place, in the latter part of October, 1850. See Zoologist for 1846 and 1850.

Wood Lark, *A. arborea*, Cornish; local: not common in the west; more frequent about Truro and Tregony.

Short-toed Lark, *A. brachydactyla*, not Cornish; very rare: one British specimen recorded as captured near Shrewsbury.

Lapland Bunting, *Plectrophanes Lapponica*, not Cornish; very rare: four specimens only recorded as captured in England by Yarrell. In this bird may be observed the connecting link between the larks and the buntings. Recent example,—Brighton, 1845.

Snow Bunting, *Emberiza nivalis*, Cornish; not uncommon in the autumnal months in the open high ground in Sancreed, Marazion and Newlyn Green, Hayle fields.

Common Bunting, *E. miliaria*, Cornish; generally distributed: frequents open and enclosed ground, and may be observed in nearly every hedge-row.

Black-headed Bunting, *E. schœniculus*, Cornish; not uncommon in marshes where bushes grow, but nowhere abundant: egg resembling that of the chaffinch. Marazion marsh.

Yellow Bunting, *E. citrinella*, Cornish; generally distributed in every hedge-row.

Cirl Bunting, *E. cirlus*, Cornish; not uncommon in hedges near Penzance towards Redinnick: eggs resembling those of the yellow bunting in markings, but the colour of the streaks in this species is dark brown, which in the other is reddish-purple.

Ortolan Bunting, *E. hortulana*, not Cornish; very rare.

Chaffinch, *Fringilla cœlebs*, Cornish; generally distributed: sings occasionally in open weather throughout the winter.

Mountain Finch, *F. montifringilla*, Cornish; rare: winter visitant. Tregembo, St. Hilary.

Tree Sparrow, *F. montana*, Cornish; very rare: one obtained near Falmouth some years since. Locally distributed in the midland counties.

House Sparrow, *F. domestica*, Cornish; generally distributed.

Greenfinch, *F. chloris*, Cornish; generally distributed.

Hawfinch, *Coccothraustes vulgaris*, Cornish; winter visitant: appears singly, and sometimes in small flocks, at uncertain intervals. Lariggan, &c.

Goldfinch, *Carduelis elegans*, Cornish; rather locally distributed.

Siskin, *Fringilla spinus*, Cornish; winter visitant: rare in the county generally. Lariggan, Gulval, &c.

Common Linnet, *Linaria linota*, Cornish; universally distributed.

Mealy Redpole, *L. canescens*, not Cornish; found occasionally in the neighbourhood of London.

Lesser Redpole, *L. minor*, Cornish; very rare throughout the county.

Mountain Linnet, *L. montana*, Cornish; very rare: one specimen only recorded as captured in the Penzance district.

Bullfinch, *Pyrrhula vulgaris*, Cornish; locally distributed and nowhere numerous.

Pine Grosbeak, *P. enucleator*, not Cornish; very rare as a British bird: observed in Aberdeenshire and Lancashire. Recent example,—Rochdale, Lincoln, 1845.

Common Crossbill, *Loxia curvirostra*, Cornish; rare: seen at distant and uncertain intervals in small flocks. Rosemorran, Trebartha woods.

Parrot Crossbill, *Loxia pityopsitticus*, not Cornish; very rare as a British bird.

White-winged Crossbill, *L. leucoptera*, Cornish; rare: an adult bird killed at Lariggan some years since, and now in a private collection at Penzance. Recent examples,—Scotland, 1841; Exmouth, 1845; Michaelover, Derby, 1846; Thetford, Norfolk, 1846,—three specimens 1847.

Common Starling, *Sturnus vulgaris*, Cornish: universally distributed in the winter months, in flocks; rare in summer.

Red-winged Starling, *Agelaius phœniceus*, not Cornish; added by Mr. Yarrell in his Supplement to the Catalogue of British Birds. See Zool., vol. i., p. 317, and Yarr. Supp., p. 31.

Rose-coloured Pastor, *Pastor roseus,* Cornish; rare: two examples have been obtained from the west of Cornwall, an adult bird from Scilly, and apparently a female from Gwithian, near Hayle.

Chough, *Corvus graculus,* Cornish; much less common than formerly; sparingly observed in different localities on the coast: breeds annually in Zennor cliffs, at the Funnel rock, St. Levan, and in the cliffs at Trewavas, Breage.

Raven, *C. corax,* Cornish: a pair may be observed in most of the ranges of our cliffs, where they principally breed.

Carrion Crow, *C. corone,* Cornish; generally distributed.

Hooded Crow, *C. cornix,* Cornish; rare: occasional visitant. Formerly abundant on Marazion Green, whence it derived one of its synonyms of "Market Jew Crow."

Rook, *C. frugelegus,* Cornish; generally distributed.

Jackdaw, *C. monedula,* Cornish; generally distributed.

Magpie, *C. pica,* Cornish; generally distributed.

Jay, *C. glandarius,* Cornish; common in the woodland districts of the county, but in the neighbourhood of Penzance and westward very rare.

Nutcracker, *C. caryocatactes,* not Cornish; very rare as a British bird: observed in Devonshire.

Great Black Woodpecker, *Picus martius,* not Cornish; very rare. Recent capture,—Knaresborough, Yorkshire, 1846.

Green Woodpecker, *P. viridis,* Cornish; very common in the eastern woodlands; rare in west Cornwall, and almost unknown in the neighbourhood of Penzance. Trevayler bottom; Castle Horneck.

Greater Spotted Woodpecker, *P. major,* Cornish; rare; sometimes seen in the eastern woodlands: a specimen obtained a short time since from Treneere lawn, near Penzance.

Hairy Woodpecker, *P. villosus,* not Cornish; a newly discovered British species. See Zoologist for 1850.

Lesser Spotted Woodpecker, *P. minor,* Cornish; rare: a specimen obtained from North-hill. The note of this bird exactly resembles the roosting call of the common blackbird.

Wryneck, *Yunx torquilla*, Cornish; rare in all parts of the county: occasionally observed in the neighbourhood of Penzance in the autumn, near the coast, probably preparing for migration. Some specimens were obtained at Scilly, with other migratorial birds, in the autumn of 1849.—See woodchat shrike, pied flycatcher, &c. Fowey, North-hill, Zennor, Scilly.

Common Creeper, *Certhia familiaris*, Cornish; commonly distributed where large trees grow. Trevethow, Lariggan, &c.

Wren, *Troglodytes vulgaris*, Cornish; generally distributed.

Hoopoe, *Upupa epops*, Cornish; examples of this bird are generally to be obtained every spring. Ludgvan, Madron, Scilly.

Nuthatch, *Sitta Europea*, Cornish; very common in the eastern woodlands, becoming more rare westward, and almost unknown in the neighbourhood of Penzance: eggs exactly resembling those of the great tit.

Cuckoo, *Cuculus canorus*, Cornish; generally distributed in the summer months.

Yellow-billed American Cuckoo; Cornish, on the authority of the notice in Yarrell's work; very rare British bird.

Great Spotted Cuckoo, not Cornish; a newly discovered British species See Yarrell's Supplement.

Roller, *Coracias garrula*, Cornish; an adult specimen seen some time since by Mr. J. N. R. Millett, of Penzance, near the Land's-end; a female shot at St. Levan: rare as a British bird. Recent captures,—Shenton Castle, Banff, 1848; Ashdown Forest, Sussex, 1849.

Bee-eater, *Merops apiaster*, Cornish. The only instances of the occurrence of this bird in this county was the capture of a flock of twelve near Helston, in 1828, and which came into the possession of the late George Borlase, Esq., of that place; and, on the authority of Mr. Couch of Polperro, four specimens were seen in the parish of Madron. Recent example,—Icklesham, Sussex, 1850.

Kingfisher, *Alcedo hispida*, Cornish; generally observed on the sea-coast, where rivers and streams empty themselves in the sea, also in creeks and inlets: nowhere common, but generally observed, from its attractive metallic colours.

Great Belted Kingfisher, *A. Halcyon*, twenty-seven shot at Armsbrook, Meath.

Swallow, *Hirundo rustica*, Cornish; summer visiter: universally distributed.

Martin, *H. urbica*, Cornish; summer visitant: universally distributed.

Sand Martin, *H. riparia*, Cornish; summer visitant: generally distributed in the neighbourhood and within reach of sand-banks. Lelant, Marazion, and Newlyn Greens.

Purple Martin, *H. purpurea*, not Cornish; very rare, and a newly-discovered British species: it is found in America.

Common Swift, *Cypselus apus*, Cornish; locally distributed. Marazion Green.

Alpine Swift, *C. Alpinus*, Cornish; very rare: one example taken near the Lizard, and afterwards preserved by Mr. Jackson, of Looe.

Nightjar, *Caprimulgus Europeus*, Cornish; locally distributed. Trengwainton; Sancreed.

RASORES.

Ring Dove, *Columba palumbus*, Cornish; generally distributed where trees, shrubberies, and plantations exist.

Stock Dove, *C. œnas*, Cornish; very rare in the western counties: two specimens obtained from Scilly a few years since. Large flocks seen this year at Merther.

Rock Dove, *C. livia*, Cornish; found occasionally in the cliffs on the south coast of Cornwall, about Looe and Polperro: one killed at Carn Galva, Madron. This species is the parent stock of all our domesticated pigeons.

Turtle Dove, *C. turtur*, Cornish; summer visitant: generally observed, in more or less numbers, in the spring months, in sheltered valleys. Pleming, Gulval, Madron, Scilly.

Passenger Pigeon, *C. migratoria*, not Cornish; not known as a British species until 1825; large flocks are reported to have been seen once or twice since: it is an American species, and most interesting accounts are given of its habits, &c., by the American ornithologists.

Black Grouse, *Tetrao tetrix,* Cornish; very rare in Cornwall: occasionally seen in the eastern moors: one reported to have been shot on Castle-an-Dinas, Gulval, some years since. Hybrids from this species and the common pheasant have been killed in the parish of North-hill.

Red Grouse, *T. Scoticus,* not Cornish, nor is it found in any of the southern or western counties.

Ptarmigan, *T. lagopus,* not Cornish. The remarks on the red grouse apply to this species.

Partridge *Perdix cinerea,* Cornish; universally distributed.

Virginian Colin, *Coturnix Marylanda,* not Cornish; a newly-discovered species in this country, supposed to have been introduced from America. See Yarrell's Supplement. Recent examples,—two specimens from Tunbridge Wells, 1850.

Common Quail, *C. vulgaris,* Cornish; rare: occasionally seen singly in the neighbourhood of Penzance.

Great Bustard, *Otis tarda,* Cornish; one observed and afterwards captured on Goonhilly, Lizard district: this proved to be a female, and is now preserved in a private collection at Penzance. This is the only recorded instance of the occurrence of the bird in Cornwall. Recent examples,— Salisbury Plain, 1849; Romney Marsh, 1850.

Little Bustard, *O. tetrax,* Cornish; very rare: one obtained from the neighbourhood of Trelowarren, and two or three besides recorded as Cornish specimens on the authority of Mr. Couch.

Water Birds.

Cream-coloured Courser, *Cursorius Isabellinus,* not Cornish; very rare British bird: three or four examples only recorded.

Great Plover, *Œdicnemus crepitans,* Cornish; occasionally observed in the Land's-end district in the winter months, and one or more examples captured every year, although it is referred to by authors as a summer visiter.

Golden Plover, *Charadrius pluvialis,* Cornish; generally distributed in the winter months over the open heaths and moors: large accessions after severe frost, when the fallow fields are visited by them.

Dottrel, *C. morinellus,* Cornish; rare: open moors and sheep walks; an inland species: one specimen killed in Sancreed.

Ringed Plover, *C. hiaticula,* Cornish; generally distributed along our sea shores, and very often associated with the dunlin: breeds early; eggs found at Scilly in April; legs and feet yellow.

Kentish Plover, *C. Cantianus,* not Cornish; occasionally seen on the beaches of the eastern counties: the colour of the legs in this species, which is black at all ages, distinguishes it from the last species, as well as its smaller size.

Little Ringed Plover, *C. minor,* not Cornish, and very rare as a British bird. Recent example,—Whixley, Knaresborough, 1850.

Grey Plover, *Squatarola cinerea,* Cornish; occasional winter visitant, especially after severe weather. Marazion Green.

Lapwing, *Vanellus cristatus,* Cornish; locally distributed. Trevear, Sennen; Tregavara moor, Madron.

Turnstone, *Strepsilas interpres,* Cornish; observed in the spring and autumn migrations, and at these times common on our flat beaches. Marazion sands.

Sanderling, *Calidris arenaria,* Cornish; not a very numerous species: specimens in winter and summer plumage frequently obtained. Hayle estuary, Marazion sands.

Oyster Catcher, *Hæmatopus ostralegus,* Cornish; not uncommon on the western coast of Cornwall: occasionally seen on Marazion sands, Newlyn beach, and Scilly. Breeds at Scilly.

Common Crane, *Grus cinerea,* not Cornish; of rare occurrence of late years in England: one killed at Buckland Monachorum, near Plymouth, in 1826; this specimen is now in a private collection at Penzance. Recent example,-Murtham, Norfolk, 1850.

Common Heron, *Ardea cinerea,* Cornish; generally distributed in suitable localities, especially in creeks and estuaries. There is a Heronry on the Lamorran river, near Truro; another near Fowey.

Purple Heron, *A. purpurea,* Cornish; two adult examples, in perfect plumage, obtained in the county within the last few years: viz.,—Killiow, Kea; Trevider, St. Buryan.

Great White Heron, *A. alba*, not Cornish; very rare British bird: said to have been seen in Devon, on the river Avon. Recent example,—Wisbeach, 1849.

Little Egret, *A. egretta*, not Cornish. The existence of this bird in Great Britain appears doubtful at the present time.

Buff-backed Heron, *A. russata*, not Cornish; very rare British bird: one killed near the Start, Devon, on the authority of Col. Montagu.

Squacco Heron, *A. comata*, Cornish; occasional visitant: St. Hilary, St. Levan, Sennen, Trereife Madron, Scilly. Generally obtained in immature plumage, sometimes the dorsal and occipital plumes partly developed.

Little Bittern, *A. minuta*, Cornish; very rare: a specimen was killed in the Lizard district, and is now in Mr. Magor's collection of birds at Redruth. Recent examples,—adult male, Pulborough, Sussex, 1843; Manchester, 1849; South Waltham, 1850.

Common Bittern, *Botaurus stellaris*, Cornish; not uncommon at uncertain and generally distant periods: frequents morasses, sedgy moors, &c.

American Bittern, *B. lentiginosus*, not Cornish; reported to have been killed in Cornwall, but no instance authenticated: very rare as a British bird: a few examples recorded of its occurrence. Recent example,—Fleetwood, 1846.

Night Heron, *Nycticorax Europæus*, Cornish; occasionally met with, and specimens obtained from east and west Cornwall, also in immature plumage: a young bird was brought alive, some years since, to Mr. Rodd, caught between Penzance and Newlyn. The cry of the bird resembled the word "qua," "qua," uttered with a harsh scream: colour of the iris orange-red. The Lizard, Crowan, Scilly, &c.

White Stork, *Ciconia alba*, Cornish; very rare: only one recorded instance, and that at the Land's-end, in May, 1848; it was obtained from the grounds of Mr. Trembath, of Mayon House, and the bird is now in a good state of preservation in the Penzance Museum.

Black Stork, *C. nigra*, Cornish; very rare: a good specimen

killed either on the Tamar or Lynher, in 1831,—this was the second recorded instance of its capture in Great Britain,—this bird is in a private museum at Penzance.

White Spoonbill, *Platalea leucorodia*, Cornish; occasionally, and especially of late years, observed in various parts of the county: a flock of several was seen and captured at Gwithian, others have been obtained from the neighbourhood of Penzance, and also from Scilly.

Glossy Ibis, *Ibis falcinellus*, Cornish, on the authority of Mr. Couch, and others, but no specimen preserved; one said to have been killed at Paul.

Common Curlew, *Numenius arquata*, Cornish; common on the sea coast, and in harbours, creeks, and estuaries: this species retires northward to breed, and is rarely seen in the summer months.

Whimbrel, *N. phæopus*, Cornish; observed in the latter part of April, and again in the autumn, in going to and returning from their northern breeding grounds: small flocks may be seen on the flat open beach between Penzance and Marazion. When disturbed their note resembles the words "luddle, luddle, luddle, luddle," quickly uttered.

Spotted Redshank, *Totanus fuscus*, Cornish; rare: occasionally met with in the autumn months. First observed at the Land's-end in 1840, since which several examples have been obtained.

Common Redshank, *T. calidris*, Cornish; not uncommon on salt marshes, and on sandy estuaries, in the autumnal and winter months,—sometimes in the spring. Hayle estuary, Marazion marsh, &c.

Green Sandpiper, *T. ochropus*, Cornish; several specimens obtained of late years from the Land's-end district, towards the autumn: more inland in its habits than the last species.

Wood Sandpiper, *T. glareola*, Cornish; not uncommon in the autumn, and sometimes in the spring months: seven specimens obtained in one day, in the month of August, 1840, from the Land's-end marshes, all of which proved to be birds of the year: smaller than the last species, with the legs longer.

Common Sandpiper, *T. hypoleucos*, Cornish; summer visiter;

seen generally in pairs on the margins of fresh-water ponds. Trengwainton, Madron; Trevethow, Lelant; &c.

Spotted Sandpiper, *T. macularius*, not Cornish; the representative of our common sandpiper in America: of very rare occurrence in Great Britain. Recent examples, — Bridlington Quay, York, 1848; Bishop's Aukland, Whitby, 1849.

Greenshank, *T. glottis*, Cornish; not uncommonly met with in the same localities as the redshank. This bird shews the connecting link between the sandpipers and the godwits.

Avocet, *Recurvirostra avocetta*, Cornish; very rare as a Cornish bird: one obtained from the Land's-end, apparently a bird of the year, in Sept., 1847.

Black-winged Stilt, *Himantopus melanopterus*, not Cornish; rare as a British bird, and only observed at distant and irregular intervals, principally in the fen countries.

Black-tailed Godwit, *Limosa melanura*, Cornish; uncommon: seen at Trengwainton ponds, and killed at the Land's-end.

Bar-tailed Godwit, *L. rufa*, Cornish; generally to be met with in the autumnal months on the flat sands and estuaries, and along the shores of our harbours and creeks, but the species affects some localities, whilst others equally favourable are deserted. In summer the breast of this species is bright bay, in winter white; the breast of the birds of the year, until the next summer, buff-coloured.

Ruff, *Machetes pugnax*, Cornish; occasionally met with in the autumnal months, in the marshes in the Land's-end district.

Woodcock, *Scolopax rusticola*, Cornish; winter visiter: universally distributed in suitable localities. Their first appearance takes place at about the last week in October, and the first flights usually take place with the wind at any point to the east from the south: the birds are usually first found in the open heathery-ground at and adjacent to hills.

Great Snipe, *S. major*, not Cornish, and very rare generally in the western counties; met with more frequently in Norfolk and the eastern counties: number of tail-feathers, sixteen.

Common Snipe, *S. gallinago*, Cornish; universally distributed in suitable localities: a brown variety, with the dorsal stripes

narrower, occasionally met with. Nest and eggs found at Tremethick marsh, Madron. Number of tail-feathers, fourteen.

Jack Snipe, *S. gallinula,* Cornish; as universally distributed as the last species: no instance recorded of its remaining throughout the summer. Number of tail feathers, twelve.

Sabine's Snipe, *S. Sabini,* not Cornish; a few examples only recorded as British; the first killed in Ireland, in 1822: a rare species throughout the world: distinguished from the other *Scolopacidæ* by not having any longitudinal dorsal stripes. Recent example,—Chichester harbour, 1845.

Brown Snipe, *Macrorhampus griseus,* not Cornish; very rare as a British bird, five or six examples only having occurred: one reputed to have been killed in Devon. Very common on the shores of America.

Curlew Tringa, *Tringa subarquata,* Cornish; common in the autumnal months along our flat beaches, associated with dunlins, ring plovers, &c.: breast in summer bright red, in winter white; sometimes killed in the intermediate state: distinguished from the dunlin, in winter plumage, by the upper tail coverts being always white.

Knot, *T. canutus,* Cornish; a few observed on most of our flat beaches in the autumnal season, generally birds of the year: in summer plumage the breast is bright red, and the feathers on the back with a greater mixture of black: specimens obtained in winter, summer, and in the intermediate states of plumage. Marazion sands. Birds which in winter have the breast white, and in summer the same part red, exhibit an intermediate or buff colour on this part when in their first or immature plumage of the year.

Buff-breasted Tringa, *T. rufescens,* Cornish; one example only recorded of its capture in Cornwall; this occurred in the month of September, 1846, when the bird was seen and shot on the flat sands between Penzance and Marazion. This specimen is in a private museum at Penzance.

Broad-billed Tringa, *T. platyrhinca,* not Cornish; one example recorded as British killed; viz., in Norfolk, in 1836: a very

rare bird in all countries, and little or nothing known of its habits. Recent example, Shoreham, Sussex, 1846.

Little Stint Tringa, *T. minuta*, Cornish; occasionally seen, and specimens obtained from salt marshes near the sea. Marazion marsh and Hayle estuary.

Temminck's Stint Tringa, *T. Temminckii*, Cornish; found occasionally in the same localities as the last species, but not so frequently. The tarsus of this bird is considerably shorter than in the last species, which is its principal characteristic distinction.

Schinz's Tringa, *T. Schinzii*, Cornish; two specimens killed on Hayle estuary, in Oct., 1846: one of these specimens is now preserved in a private museum at Penzance. This is an extremely rare British bird, and Mr. Yarrell refers to one only having been killed, and that in Shropshire. It is very nearly allied to the dunlin, but its white rump and shorter bill are distinguishing characters, and also the absence of the black patch on the breast in summer. See Zool. 1846, p. 1554.

Pectoral Tringa, *T. pectoralis*, Cornish; Scilly. I quote the words of Mr. Yarrell in reference to the capture of this interesting species in Cornwall:—"D. W. Mitchell, Esq., of Penzance, sent me in June, 1840, a coloured drawing of the natural size, and a fully detailed description with measurements, of a sandpiper, shot by himself on the 27th of the previous month, while the bird was resting on some sea-weed within a few yards of the water on the rocky shore of Annet, one of the uninhabited islands of Scilly.—On the following day another example was seen, but became so wild after an unsuccessful shot that it took off to another island and escaped altogether.—The close accordance of the specimen obtained with the description of *Tringa pectoralis* in summer plumage in the 4th part of M. Temminck's Manual, led Mr. Mitchell to a true conclusion as to the species and its novelty and interest in this country."

Dunlin Tringa, *T. variabilis*, Cornish; generally distributed on all our flat beaches throughout the year, but more especially in the winter months: observed occasionally, in the summer,

on Bodmin moor near Trewortha marsh. Distinguished from the curlew tringa by the brown and rufous feathers extending all the way over the back and upper coverts of the tail, which in the other species are white.

Purple Tringa, *T. maritima*, Cornish; not unfrequently seen on the rocks extending into the sea, both in the spring and winter. Battery rocks, Wherry rocks, and Long rock, Mount's-bay. The figure in Bewick's work on British Birds under the word "Knot" is referable to this species in winter plumage.

Cream-coloured Courser, *Cursorius Isabellinus*, not Cornish; a very rare British bird; one or two instances of its capture only, recorded.

Collared Pratincole, *Glareola torquata*, not Cornish; very rare as a British bird. Recent specimen,—Bedlington, Northumberland, 1850.

Land Rail, *Gallinula crex*, Cornish; locally distributed over the east and west of Cornwall: common in the spring and summer in the grass-land about Penzance: nest and eggs frequently found.

Spotted Crake, *G. porzana*, Cornish; occasional winter visitant: specimens have been obtained from the neighbourhood but its occurrence is rare.

Little Crake, *G. minuta*, not Cornish (?). This is a rare British bird, and although no recorded Cornish example exists, Mr. Drew, naturalist, late of Plymouth, had a specimen which he said he received from the neighbourhood. The next species has been captured in Cornwall, and it is probable that the present species also exists.

Baillon's Crake, *Crex Baillonii*, Cornish; one specimen obtained from the basin of Penzance Pier, and is in a private museum at Penzance: a rare British species.

Moor Hen, *Gallinula chloropus*, Cornish. The remarks on the water rail apply to this species.

Water Rail, *Rallus aquaticus*, Cornish; generally met with in suitable localities, — viz., sedgy morasses, overgrown wet ditches, &c.

Common Coot, *Fulica atra*, Cornish; not unfrequently met with in some localities, but not so numerous as the two former.

Grey Phalarope, *Phalaropus lobatus*, Cornish; occasional visitant and often in large numbers in the autumnal and winter months, but at uncertain intervals.

Red-necked Phalarope, *P. hyperboreus*, not Cornish; found principally in the Northern Islands.

Natatores.

Grey Lag Goose, *Anser ferus*, not Cornish; no recorded instance exists of this bird having occurred in Cornwall; but the appearance of it, as well as many other northern birds, to southern latitudes, depends so much upon the severity of our winters, that their occurrence at suitable periods ought not to be looked upon as improbable.

Bean Goose, *A. segetum*, Cornish; this is our common wild goose observed in severe winters in large flocks: unless there is a strong frost, and of some continuance, in the north, they are seldom seen in the southern and western counties.

White-fronted Wild Goose, *A. albifrons*, Cornish; not unfrequently obtained at the Land's-end in the winter months.

Bernicle Goose, *A. bernicla*, Cornish; sometimes obtained from the Land's-end marshes, and it has been observed in Mount's-bay.

Brent Goose, *A. brenta*, Cornish; occasional visitant, and in considerable flocks in hard winters: during severe frost they appear to be oceanic in their habits, frequenting Mount's-bay at a distance of from half-a-mile to a mile from the land.

Red-breasted Goose, *A. ruficollis*, not Cornish; very rare as a British but common as an Arctic bird.

Egyptian Goose, *A. Œgyptiacus*; existence as a true British species doubted.

Spur-winged Goose, *A. gambensis*, Cornish; the only recorded British specimen was killed near St. Germans, in June, 1821, and, in a mutilated state, was given by Mr. Henry Mewburn of that place to the late Mr. Bewick, whose figure, in his British Birds, was taken from this individual, — a most valuable acquisition to the Cornish Fauna.

Hooper, or Wild Swan, *Cygnus ferus*, Cornish: the hooper is generally observed in the western counties after a long continuance of hard frost, and the bird is then observed in some numbers in harbours, &c.

Bewick's Swan, *C. Bewickii*, Cornish (?). This species was so long confounded with the former, as a small variety, that I have ventured to record it as Cornish: the distinctive characters of the two birds are beautifully illustrated in a series of anatomical engravings by Mr. Yarrell, in his 3rd. vol. of British Birds.

Mate Swan, *C. olor;* only known as domesticated.

Polish Swan, *C. immutabilis*, not Cornish; a new species discovered as British by Mr. Yarrell, and large flocks observed in the severe weather of January, 1838.

Ruddy Shieldrake, *Todorna rutila*, not Cornish; a rare British bird, a few specimens only having occurred. Recent example,—Murrogh of Wicklow, 1847.

Common Shieldrake, *T. vulpauser*, Cornish; not uncommon in severe winters: specimens on several occasions obtained from the ponds at Sennen.

Shoveller, *Spathulea clypeata*, Cornish; not uncommon in severe winters at the Sennen ponds.

Wild Duck, *Anas boscas*, Cornish; universally distributed in suitable localities, especially in hard winters, when immense numbers resort to the pools and marshes near the Land's-end, being the most extreme point of refuge westward, in pursuing a course to avoid the rigours of intense cold.

Gadwall, *Chauliodus strepera*, Cornish; rare: one specimen, and the only one recorded from this neighbourhood, killed on Trengwainton ponds.

Pintail Duck, *Querquedula acuta*, Cornish; common in the Land's-end district in severe weather.

Bimaculated Duck, *Q. glocitans*, not Cornish; a very rare British species, and two or three individuals only recorded as British killed. Recent example,—Lincolnshire fens, 1850.

Garganey, *Q. circia*, Cornish; a rare visiter in Cornwall: a few summers since several were obtained in the neighbourhood of Penzance in very beautiful plumage, and preserved:

this is the only instance of the occurrence of the species, and none observed since that time.

Teal, *Q. crecca*, Cornish; the most regular of our duck visiters every winter, appearing sometimes early in the autumn, and at times in large numbers in the marsh pools at the Land's-end.

Wigeon, *Mareca Penelope*, Cornish; a regular visiter to the Land's-end district every winter, but not so generally distributed as the last described species.

American Wigeon, *M. Americanus*, not Cornish; a newly discovered British species. See Yarrell's British Birds, vol. 3., p. 196.

Eider Duck, *Somateria mollissima*, Cornish; one specimen killed on the river Looe: rarely seen in southern latitudes.

King Duck, *S. spectabilis*, not Cornish; this species is rare in England, but has been found breeding in the Orkneys.

Velvet Scoter, *Oidemia fusca*, Cornish; sometimes seen in Mount's-bay, and one shot at Penzance quay.

Common Scoter, *O. nigra*, Cornish; rare: occasionally seen in Mount's-bay and captured. All the scoters are oceanic in their habits, and are more frequently seen at sea than inland.

Surf Scoter, *O. perspicillata*, not Cornish; a rare bird in England, and only occasionally seen in the north of Scotland.

Western Duck, *Fuligula dispar*, not Cornish; a very rare American species: one example only has occurred in England, in 1830, near Barmouth, in Norfolk. Recent example,—Filby, York, 1846.

Red-crested Whistling Duck, *F. rufina*, not Cornish; very rare as a British bird: first noticed in England in 1826. Recent example.—Hornsea, Norfolk, 1844.

Pochard, *F. ferina*, Cornish; not uncommon in the winter months after frost in the Land's-end district.

Nyroca Pochard, *F. nyroca*, not Cornish; a rare bird in the southern English counties.

Scaup Duck, *F. marila*, Cornish; rare in the western districts, a few occurring in severe weather: the female has a broad white patch at the base of the bill.

American Scaup, *F. mariloides*, not Cornish; a newly discovered

British bird, first noticed by Mr. Doubleday, and recorded by Yarrell: common in North America. English specimens purchased in Leadenhall market a few winters since.

Tufted Duck, *F. cristata*, Cornish; found in the Land's-end district in all winters with more or less frost.

Long-tailed Duck, *Harelda glacialis*, Cornish; very rarely found in the southern counties of England: a female killed on Marazion marsh a few years since, and now preserved in a private museum.

Harlequin Duck, *Clangula histrionica*, not Cornish; a rare British duck: breeds in Iceland, and has been killed in France. It is not improbable therefore that our county may still be visited by this very elegant species. Recent examples,—a flock at Torquay, 1847.

Golden-eye, *C. vulgaris*, Cornish; not an uncommon species in hard winters in the Land's-end district.

Buffel-headed Duck, *C. albeola* not Cornish; a newly discovered British species.

Smew, *Mergus albellus*, Cornish; rare: a few instances of its occurrence on record. A specimen obtained from the ponds at Pendarves, and one, either a female or male in immature plumage, from the neighbourhood of Penzance.

Hooded Merganser, *M. cucullatus*, not Cornish; a rare British bird: the first example in 1829, and three or four more since, forming its claim to be included in the British Fauna. General habitat, North America.

Red-breasted Merganser, *M. serrator*, Cornish; generally a winter visiter, and during severe weather not a very uncommon bird.

Goosander, *M. merganser*, Cornish; sometimes observed in Mount's-bay, but only in winter plumage: the adult male has the breast of a beautiful glowing maroon buff colour. Perran Uthnoe.

Great Crested Grebe, *Podiceps cristatus*, Cornish; not uncommon in winter on marshes in the Land's-end district: it is rarely met with in the southern and western counties in its tufted plumage.

Red-necked Grebe, *P. rubricollis*, Cornish; quite as often oc-

curring as the last species,—frequenting the same localities: sometimes killed towards the spring, when some of the red feathers on the neck appear, characteristic of its nuptial livery. Base of the bill in this species yellow.

Horned Grebe, *P. cornutus*, Cornish; specimens not in adult plumage occasionally obtained from the Land's-end district, but less numerous as a species than the last two species.

Eared Grebe, *P. auritus*, Cornish; specimens not unfrequently obtained from the neighbourhood of Penzance, but always in immature plumage: a specimen in adult summer plumage obtained some years since from St. Just pool, Falmouth harbour, and now in the Truro museum.

Little Grebe, *P. minor*, Cornish; the most commonly distributed of all the grebes in the Land's-end district. In summer plumage the neck is dark red with the chin black, and as such it has been described as a distinct species, under the name of "the black-chinned grebe;" in this state it has been obtained from Trengwainton ponds, Madron;—it is usually known by the name of "dabchick."

Great Northern Diver, *Colymbus glacialis*, Cornish; found in more or less numbers every year in Mount's-bay, generally in immature plumage, and in the autumnal months, though of late years, some specimens in adult plumage have been killed. It is now supposed that the full spotted plumage of this bird, and of the other two species, is not only indicative of immaturity, but also of the adult summer plumage,—this plumage giving way at the autumnal moult to the "Imber" plumage. See articles in the Zoologist on the plumage of this bird.

Black-throated Diver, *C. arcticus*, Cornish; more rare than the former species, but sometimes seen in Mount's-bay.

Red-throated Diver, *C. septentrionalis*, Cornish; common in the autumnal and winter months in Mount's-bay, and at this season invariably found without the red throat, and in the plumage represented by Bewick as the "speckled diver," which is supposed to be this bird after the autumnal moult.

Common Guillimot, *Uria troile*, Cornish; frequently seen singly,

and in small parties, in Mount's-bay, and around our coast. This bird, which is about the size of a bantam fowl, lays its single egg, which is quite as large as that of a turkey, and scarcely two are found alike,—some being green, white, and of the intermediate tints, some immaculate, and others more or less spotted.

Brunnich's Guillimot, *U. Brunnichii*, not as yet recognized as Cornish; observed in the north of Scotland, and also on the coast of Kerry.

Ringed Guillimot, *U. lacrymans*: the specific distinction of this bird from the common guillimot is doubted.

Black Guillimot, *U. grylle*, Cornish; rare on the western coasts of Cornwall: one example, in intermediate plumage, taken some years since in Mount's-bay.

Little Auk, *Mergulus melanoleucos*, Cornish; not unfrequently met with in Mount's-bay in some seasons: other instances of its capture in the county are recorded, although regarded as a rare bird.

Puffin, *Alca fratercula*, Cornish; occasionally observed on the Land's-end cliffs, but the precipitous rocks on some of the islands at Scilly appear to be its favourite haunts, where it annually breeds: egg dirty white.

Razor Bill, *A. torda*, Cornish; a common species, sometimes appearing in small parties in Mount's-bay, and all round our coast, especially at Scilly.

Great Auk, *A. impennis*, not Cornish; and one of our rarest British birds.

Common Cormorant, *Phalacrocorax carbo*, Cornish; generally distributed throughout the western coast of Cornwall, sometimes observed inland. Number of tail feathers, fourteen. This, with a white patch over the thigh, and on the throat, distinguishes it in summer from the common shag.

Common Shag, *P. cristatus*, Cornish; more numerous as a species than the last, and more frequently observed in creeks and arms of the sea. Number of tail feathers, twelve. A reverted occipital crest distinguishes it in summer plumage.

Gannet, *Sula bassana*, Cornish; not unfrequently observed, and

sometimes in small companies, in Mount's-bay and on the north coast. The young of the year is remarkable for a plumage wholly unlike that of the adult bird, being smoke-grey, studded all over with minute white specks. Not known to breed on the Cornish coast, or at Scilly.

Caspian Tern, *Sterna Caspia*, not Cornish; not observed on any of the coasts of the western counties, but several specimens obtained from the eastern coasts. Recent examples,—Great Yarmouth, 1849, 1850.

Sandwich Tern, *S. cantiaca*, Cornish; a few pairs observed in the summer months on some of the islands at Scilly, where they annually breed: found sparingly on the Land's-end coast.

Roseate Tern, *S. Dougallii*, Cornish; abundant in summer at Scilly: breeds on Annet, a Scilly rock, and some other localities near. This bird exhibits in summer a most delicate hectic glowing blush-red on the throat, breast, and belly, which is more or less evanescent in some lights.

Common Tern, *S. hirundo*, Cornish; more or less common in the summer in Mount's-bay, approaching nearer the shore in windy weather: less abundant at Scilly than the roseate or Arctic terns, but it breeds annually there.

Arctic Tern, *S. Arctica*, Cornish; a common species in summer both on our coast and at Scilly, at which latter locality its eggs may be obtained every year. In some seasons various parts of England are visited with large flights of these birds.

Whiskered Tern, *S. leucopareia*, Cornish; an immature specimen obtained in the month of Sept. 1851, at Scilly: a rare and newly discovered British bird, first included in the catalogue of British birds in 1836; little known of its habits: observed in France, Hungary, and Germany. Recent example,—Dublin bay, 1847.

Gull-billed Tern, *S. Anglica*, not Cornish; a few examples only have been captured in England: there is one in a private collection at Penzance, presented by the Rev. Mr. Rice, of South-hill, together with a portion of the egg of the bird, which dropped when he shot the bird, near Brighton. Recent examples,—Breyden, Norfolk, 1850; Yarmouth (summer plumage), 1850.

Lesser Tern, *S. minuta,* Cornish; several examples of this small tern have been obtained close by the town of Penzance: not observed in summer at Scilly.

Black Tern, *S. nigra,* Cornish; generally observed in the autumnal months, and nearly every year, in more or less numbers, on the sea-side and inland. In its full black plumage it is rarely met with in Cornwall.

Black Noddy, *S. stolida,* not Cornish, and rare as a British bird. An American species. See Audubon.

Sabine's Gull, *Larus Sabini,* Cornish; rare: occasionally obtained in winter in its immature plumage. This bird has been mistaken for the little gull, but in its young state it may be known by the absence of black in the wing, by the greater length and slenderness of the beak, and by the tail in the present species being *deeply forked,* instead of being *square.* Mr. Selby, however, has erroneously described the tail of the little gull as *forked.* Both this and the little gull assume black on the head and neck in the spring months.

Little Gull, *L. minutus,* Cornish; rarely met with, but specimens in adult and immature plumage have been obtained at Penzance and the Land's-end,—the latter in the month of December, 1844. The young bird has a broad black bar on the wing, somewhat resembling the immature kittiwake; bill stronger and more arcuated than the last species: tail with a black tip, and *square.* See Sabine's gull. Recent examples,—Lewis, 1850.

Masked Gull, *L. capistratus,* not Cornish; very probably overlooked and confounded with the next described species: specimens obtained from the north, and until lately an undescribed species, resembling in general appearance the black-headed gull, but it is smaller, and its beak is shorter and more slender. Recent example,—Dart, Devon, 1850.

Black-headed Gull, *L. ridibundus,* Cornish; not uncommon on the sands at Hayle, in winter, and occasionally remaining on till the summer plumage is assumed: specimens in both states of plumage obtained.

Laughing Gull, *L. atricilla,* not Cornish; rare as a British bird,

and few instances recorded of its capture. See Audubon. First example made known as a visiter to the British shores by Montagu, who reports in his Dictionary that five were seen on Shingley flats, near Winchelsea.

Kittiwake Gull, *L. tridactylus*, Cornish; common on our coasts generally: the birds of the year have two black bars on the wing, which is not the case with the other common gulls.

Ivory Gull, *L. eburneus*, Cornish; very rare: the only recorded example of this bird in Cornwall, was captured off the pier at Penzance, in the month of February, 1847, and the following note was taken at the time and reported in the Zoologist:—Observed for some days previously associated with sea mews and herring gulls; alighted several times on the New Pier, Battery rocks, &c., apparently not shy; note of the bird described as being like the warbling whistle of oystercatchers, the reverse of harsh and grating,—this peculiarity attracted the notice of men and boys at the quay, who are used to the screaming and clamorous cries of the common gulls. Length 17½ inches. Plumage studded with well defined dusky brown spots, some more obscure than others. (Abridged from the Zoologist.) See vol. for 1847, p. 1699. Recent capture,—Hastings, 1848.

Common Gull, *L. canus*, Cornish; generally distributed in more or less numbers along our coasts.

Iceland Gull, *L. islandicus*, Cornish; rare.

Lesser Black-backed Gull, *L. fuscus*, Cornish; generally distributed, and seen associated with the herring gulls in large numbers on our flat sands and open estuaries. Hayle, Marazion sands, &c.

Herring Gull, *L. argentatus*, Cornish; the most common gull on our coast, and generally distributed in estuaries, creeks, open sands, and precipitous cliffs.

Great Black-backed Gull, *L. marinus*, Cornish; one or two may be seen at all times and seasons, in different localities, along our coast, frequenting rugged rocks and sometimes open beaches, generally seen singly, or in pairs. Hayle sands; Marazion sands; Land's-end; Scilly Isles.

Glaucus Gull, *L. glaucus*, Cornish; occasionally observed, but by no means regularly or frequently. This bird, together with the Iceland gull (its smaller congener), may be known from other gulls by the tips of the wings being white, which in the other gulls are black, except the ivory gull.

Common Skua, *Lestris catarractes*, Cornish; rarely met with in the western counties.

Pomerine Skua, *S. pomarinus*, Cornish; occasionally, and at uncertain intervals, occurring on our coast, and in every instance in immature plumage: specimens obtained from Mount's-bay.

Richardson's Skua, *L. Richardsonii*, Cornish; observed rarely on our coasts, and more rarely in adult plumage. The figure in Bewick of the Arctic gull is this species in adult plumage.

Buffon's Skua, *L. parasiticus*, Cornish; very rare: a specimen found inland in the parish of St. Buryan, in adult plumage, is now in a private collection of birds in Penzance.

Greater Shearwater, *Puffinus major*, Cornish; occasionally seen, and specimens obtained from Mount's-bay, and well known at Scilly, where it goes by the name of "hackbolt."

Manx Shearwater, *P. Anglorum*, Cornish; well known at Scilly, where they annually breed in rabbit holes, known there by the name of "coccathrodon."—See an interesting account of this species in Yarrell, vol. 3, p. 509, from the pen of Mr. D. W. Mitchell, formerly of this town, and now Secretary to the Zoological Society of London. Egg glossy pure white.

Fulmar Petrel, *Procellaria glacialis*, Cornish; very rarely observed in the south of England: one specimen taken alive at the Land's-end, and another reported to have been captured in Mount's-bay.

Bulwer's Petrel, *Procellaria Bulwerii*, not Cornish; only one British specimen recorded, which was found on the banks of the Ure, near Tanfield, Yorkshire.

Wilson's Petrel, *P. Wilsoni*, Cornish; one specimen only obtained from Cornwall, and this was found dead in a field near Polperro, and passed into the hands of Mr. Couch, who forwarded it to Mr. Yarrell, whose figure of this bird was taken from the above Cornish specimen.

Fork-tailed Petrel, *P. Leachii*, Cornish; several specimens of this small petrel have from time to time been obtained on our coasts, and it is not uncommonly met with very far inland, generally dead or in an exhausted state.

Storm Petrel, *P. pelagica*, Cornish; of frequent occurrence in the summer months, and observed at a distance of five or six miles out in Mount's-bay, sometimes in small flocks, in fine summer evenings at sunset, flying and hawking about in pursuit of small insects, in the manner of the swallow tribe, sometimes dipping, but seldom alighting, on the sea, skimming for a few seconds with open wings, and mounting again in the air,—whilst thus engaged, they appear to be wholly regardless of danger, and heedless of man. Abundant at Scilly, where they breed. Egg white with a zone of rufous at the larger end.

Remarks on Trevethy Stone, Cornwall.

By E. H. PEDLAR, Esq.

THIS cromlêh, which rests upon a mound or tumulus raised a few feet above the level of the field in which it stands, is constructed of seven stones, with a supernumerary one which appears to have been added for giving stability, either at the time the structure was raised or at some subsequent period. The seven stones are disposed two on the south, two on the *north side, one* at each end, and a top or cover-stone, besides the additional one mentioned above. The four stones on the north and south sides are pretty nearly upright; that at the east end inclines a little outwards, the top overhanging the base about a foot, while the other at the west end is nearly prostrate, its uppermost end resting against the eastern stone: at the lower corner of the latter a portion is wanting, leaving an aperture about 2 feet wide and near 3 feet high, but whether by accident or design is uncertain. The top stone is sustained by only three of the others, namely by one on each of the sides and by that at the eastern end; the other two side ones appear to have sunk by their own weight and to have receded from the upper stone; the increased pressure from this cause thrown upon the eastern stone may have forced its top a little outward and perhaps endangered the building. Whether this circumstance or some other accident occasioned the fall of the western one, or whether this latter may have been purposely placed in its present position, that its resistence might add to the immovability of the eastern stone, is not clear, but there can be hardly a doubt that the

additional one spoken of before was added for the sake of strength; at present it gives no immediate support to the top, but like two of the others at the sides may have sunk away from it. In its present position, it seems to act as an important buttress, the upper part resting against a small stone which has been evidently introduced as a wedge between the eastern one and that adjoining the south. By means of this stay at the top, and perhaps by the additional aid of the western stone pressing against its base within, the stone at the east end appears to be kept in its position and prevented from yielding further to the weight above, and thus the covering-stone is securely sustained.

It is suggested by Borlase that the top stone of a cromlêh is more easily placed on three supports than on more, and on that account three are the usual number. If this remark be well founded we must presume the two side stones supposed to have sunk are in their original position, and at no time contributed to the support of the covering-stone.

The top stone is somewhat longer than wide; its shape is not quite a right-angled parallelogram, but rather an irregular rhomboid or lozenge, the longest diagonal being from S.W. to N.E.: it has a hole pierced through it near the north-east corner.

2nd Oct., 1850.

Since the above was written another examination of the cromlêh has suggested the following additional remarks:—

There can hardly be a doubt that the stone now lying within the cromlêh once stood upright at its western end. Its size and shape are suited to fill the open space left at that end and to complete the inclosure of the area within. The position in which it now lies is just what it must have taken in falling from the upright one, whilst its great weight and confined situation preclude the probability of its ever having been disturbed since it fell.

The opening left at the lower corner of the eastern stone is a remarkable feature, and does not appear to have been hitherto

regarded with the attention it deserves.—Norden boldly terms it "the dore or entrance." It may here be remarked that the mound or hillock on which the cromlêh stands is not continued quite round it; if it were, the supposed door-way would be nearly concealed; but the ground is on one side just on a level with the field, apparently to give access to this opening, and it is also on a level with the ground within the cromlêh. But what need could there have been of this opening, for an entrance which could be used only by crawling on all fours, when other appertures on either side existed by which admission could be obtained? or to what purpose was it needful to have an entrance at all? If it ever led to any passage or subterranean recess no appearance of such is now to be seen; nor is it easy to conceive if there had been any, how the huge stones comprising the superstructure could have found a secure support for their vast weight during the ages they have retained their position. But may not this mysterious opening, and the still more mysterious perforation of the stone above, have some connexion with each other? May we consider both these as in some respects allied to what are called "Tolmêns" and "holed stones?" The hole in the covering-stone will be found on examination to be somewhat circular, with flattened sides, rather longer than wide, the diameter about six inches: its axis is not perpendicular to the plane of the stone, but accords with the true perpendicular, an indisputable proof that its purpose, whatever it was, had relation to the present position of the stone: on dropping a plumb-line through it the line will be found to fall just exactly opposite the middle of the so called "door" below, and at a distance of about a foot from it: it is scarcely to be supposed that this coincidence is accidental. If what has been related by historians of the superstitious uses to which these tolmêns and holed stones were wont to be applied is entitled to our belief, we might be easily led to the conclusion that we have before us in this cromlêh contrivances peculiarly well adapted for the practice of such rites. We might picture to ourselves the religious devotee creeping on hands and knees through the narrow entrance to gain admission into the chamber within, the wondrous construction of which, together with the supposed

sanctity of the place, increased perhaps by darkness and the memory of the dead beneath, would be well calculated to work upon his imagination and facilitate the belief of his communing with the invisible world: the moment of his entrance or exit would be seized by the priest to pour the sacred libation or the waters of lustration through the hole above so as to fall upon the prostrate worshipper. But until the authorities for these supposed usages shall have been well examined and found entitled to credence, it would be unsafe and unsatisfactory to indulge in such speculations, nor is it intended to enter on an investigation of this kind in this brief notice.

A few words remain to be said respecting the stone considered as supplementary, and not forming part of the original plan of the cromlêh. It will be intelligible enough, that to retain the top stone in a position of rest the builder might have found it necessary to lower the height of the eastern stone, which is its sole support at that end. That to effect this, the stone might have been inclined a little outwards, and to secure it in this position seems to be the object of the species of flying buttress we have mentioned. But why was this support applied to a sort of wedge at the corner, between the inclined stone and its nearest neighbour, rather than to the middle of the stone which required this support? No explanation seems at hand, unless it be that it was placed on one side that it might not obstruct the approach to the door-way below.

The construction of the cromlêh may be shewn by putting together a few cards in the following manner:—set a card on its end upon the table, holding it a little inclined from the perpendicular; on the side of the obtuse angle lay another card on its face, one end a little raised above the table and resting on the first card; set two other cards upright, on their side edges, one on each side of the first, and leaning against it: the object now will be to lay a card over all these so as to rest on the two corners of the side ones, and the top edge of the first; if this latter be gradually inclined, a position will be found when the top card will rest: let another card be placed leaning against the first, so as to sustain it, when the aid of the hand may be withdrawn. If we imagine the side cards to be divided into two, perpendicularly in the middle, each stone in

the cromlêh will be represented; but we have this difference, that in the miniature copy our mimic "arc-boutant" is applied to the face of the card, and not at the corner as in the original.

Whatever may have been the purpose which cromlêhs were intended to fulfil, whether that of tombs, or altars, or historic monuments, we must undoubtedly consider them as exhibiting the greatest efforts of architectural skill of which the age to which they belong was capable; and however rude may appear these primitive essays in this sublime art, it must be acknowledged that they successfully accomplished two at least of its most important objects, grandeur of effect, and durability of existence. Beauty of form, as it is an element which is the product only of cultivated intellect, was not to be looked for. The tors and carns of the country, strewn with innumerable blocks of granite in wild disorder, or grandly piled on each other with all the appearance of design, not only supplied material, but possibly suggested the type and character of the building: and even in our own day, with the knowledge of what modern science can achieve, it is scarcely possible to contemplate these venerable structures without surprise bordering on wonder. We admire the apparent ease by which stones of prodigious bulk and weight have been transported from a distance, and set in order, and the skill by which they have been often poised on each other, with such nice adjustment, as to seem almost hanging in air, and threatening every moment a fall

"atra silex jamjam lapsura cadentique imminet assimilis,"

yet have continued unmoved under the assaults of time, and the elements, for centuries of years,—outliving many a proud monument of a more refined age. To us they serve as so many links, connecting the present with the primitive periods of society, when some of the commonest arts of life were yet unknown; bridging over as it were intervals of time that embrace a large portion of the history of the human race. We see in them the self same objects which were selected, brought together, and set up in the identical positions where they now stand, by the hands of a people who lived, probably, anterior to the earliest written records of our Islands, but of whose history, and even name, we are left in a

great degree in doubt. Like the pyramids of Egypt they bear no inscription, not a letter or sculpture of any kind, which might serve to dispel the mystery which hangs over their origin and use. If any new light on this obscure subject is ever to be obtained, it seems likely to be found only in a more careful examination of these structures, as existing here and on the continent, and a strict scrutiny of such authors as are likely to afford information respecting the habits and manners of the races by which western Europe was first inhabited.

May, 1851.

Short note on the Pilchard, more especially with reference to its migration during the summer of 1850.

By THOMAS SIMON BOLITHO, Esq.,

MEMBER OF THE SOCIETY.

ALTHOUGH there are several very valuable Papers on the habits of the Pilchard in the Transactions of the Polytechnic Society, as well as of our own, from the pen of our worthy secretary, Mr. Couch, and of his father, Mr. Couch, of Polperro, it must be admitted that we have yet much to learn on this subject; and I cannot but think that every fact connected with the movement of our always welcome, though somewhat capricious visitor, is worthy of being recorded.

1. The old notion that pilchards come from the Northern Ocean is now quite exploded. There can be no doubt that the large *schulls* which visit our shores come from the south-west; this was very clearly shewn to be the case in the year 1836, and since that period it has been fully confirmed, especially in the present year. On several occasions during the months of July, August, and September, masters of vessels have reported having fallen in with pilchards south-west of Scilly.

2. A few scattered pilchards remain in our southern channel during the entire year, but it is not until about Midsummer that the first *schulls* (which are usually small) make their appearance; and as nearly as possible at the same time the pilchards arrive on the west and north-west coast of France, and on the northern coast

of Spain: the French and Spanish pilchards are not much more than one-third as large as our fish. Why the larger fish should keep on the northern coast is, I believe, unaccounted for: the temperature of the water must be nearly the same.

3. Although I have heard old fishermen speak of catching pilchards in their *drift* nets from Midsummer till the end of September *without interruption* (and I have a record of a large *schull* having been enclosed in Mount's-bay on Midsummer day, about eighty years since), yet during the last thirty years no considerable quantity has been caught in drift nets before the second or third week in July, and it has seldom happened that any *schull* has been enclosed in a *sean* before the last week in that month. This season the drift boats caught some quantity during the first days of July, and on the tenth a *schull* of about one hundred hogsheads was enclosed in a *sean* at Penberth.

4 The usual movement of the summer fish has been from west to east during July, their course being in some degree regulated by the state of the tides. After the first few days of August it has been generally found that *some* of the *schulls* are coming *down* channel, and then it is that the Mevagissey fishermen expect to fill their cellars. *In* 1850 *we have not heard of a fish being caught with its head to the westward.* From the end of June to nearly the end of September there has been, with slight exceptions, a succession of *schulls* passing through Mount's-bay to the eastward. These appeared to cease about the second week in September, but on the 19th some of the Mousehole fishermen *shot* their nets at a greater distance from the shore and fell in with a fresh *schull.* These fish were much larger than those previously taken, and had *spawn* in them.

5. The quantity caught during the months of July, August, and September in this year is larger than it has been, in the same period in any year, for a long time past, about 18,000 hogsheads having been cured up to the 1st of October. While the pilchards were so plentiful in Mount's-bay, during the early days of August, the fishermen observed unusually large quantities of sea-lice in the water. This seems to bear out Mr. Couch's statement that the pilchard visits our shores in search of food.

6. The pilchards caught this year, with little exception, have yielded a very small quantity of oil; indeed it was evident that many of them had shed spawn not long before they were taken. *While on this,* I may observe that I have seen roes in pilchards during more than half the year, and an old fisherman lately assured me that he had met with roes in pilchards during every month of the year.

7. Mr. Couch is not quite correct in stating that the pilchards do not visit the coasts of France and Spain in such large bodies as appear in our channels. The fishery on the north of Spain, as far as I can collect, is on a scale nearly as extensive as our Cornish fishery; but I have not been able to obtain very accurate information on this point. On the north-west coast of France the pilchard fishery is of greater importance than with us; the fishery, which is wholly carried on by drift boats, extends from Brest to about Belle Isle: between the small ports of Douarnenez and St. Louis there are more than 1,000 boats employed on it. The French fishermen throw out their nets during the day-time towards evening; probably the water is not so clear as it is in our channels: they use the roes of codfish, imported from Norway, to attract the fish. The season of 1849 was unusually productive: there were no less than 120,000 casks cured, weighing 180 lbs. each,—about one third of one of our hogsheads; but on an average the quantity cured is about 80,000 to 90,000 casks, or nearly half as much again as the quantity cured in Cornwall. In 1849 about 10,000 to 20,000 casks were sent to Italy, but this is the first instance I have ever known of French pilchards coming into competition with those exported from Cornwall. In most cases the whole of the fish caught are consumed in France. The mode of curing is very similar to that practised here. The fishery commences on the French coast towards the end of June, and continues, with slight interruption, till the middle of November.

Blue Shark.

As in some measure connected with the pilchard fishery, I may mention that blue sharks have been unusually plentiful this season:

on one morning I saw more than twenty of these troublesome depredators thrown ashore from one boat at Mousehole. The general size has been from twenty inches up to four feet. One which I noticed was not much short of six feet in length, and I believe some were even larger.

The total quantity of pilchards cured for exportation in 1850, has been 25,823 hogsheads, against 25,588 hogsheads in 1849 (the average of ten years has been 21,732 hogsheads).

There were caught,—

	In Mount's-bay.	East of Lizard.	St. Ives.		Total.
In July.....	1,378	180	220	.....	1,778
„ August ...	5,813	4,330	1,596	.....	11,739
„ September.	2,592	2,889	....	.....	5,481
	9,783	7,399	1,816		18,998
„ October...	....	....	2,848	211 Newquay	3,059
„ November.	....	....	3,766		3,766
	9,783	7,399	8,641		25,823

The quality of the summer fish was by no means good. The general price was 46*s.* 6*d.* to 47*s.*, though some parcels were sold at 44*s.*, and 25*s.* to 30*s.* per hogshead for small fish; but, on account of the quality, a large proportion was shipped for Curers' account.

The October fish were of fair quality, and sold at 50*s.* 6*d.* and 53*s.* The fish caught early in November, very similar in quality to those caught in October, fetched 55*s.*, and the last cargoes 60*s.*, per hogshead.

Distribution of Pilchards Exported from 1833 to 1850, inclusive.

	Genoa.	Leghorn.	Civita Vecchia.	Naples.	Ancona. Venice. Trieste.	Malta.	Total.	Price per Hogshead.
1833	617	1425	368	3882	3632	.....	9,924	50*s.*
1834	2558	4199	1457	7441	9136	293	25,084	36*s.* to 55*s.* 6*d.*
1835	1076	5281	2122	8819	5964	552	23,814	35*s.* to 40*s.*
1836	827	5060	.....	3647	9184	.....	18,718	36*s.* to 40*s.*
1837	.....	4171	.....	6434	4759	.....	15,364	40*s.* to 58*s.*
1838	505	744	.....	4080	2298	.....	7,627	55*s.* to 60*s.*
1839	640	1546	550	5618	4470	.....	12,824	55*s.* to 60*s.*
1840	600	2820	1028	7967	10895	.....	23,310	60*s.* to 70*s.*
1841	420	2795	.....	3629	2761	.....	9,605	50*s.* to 55*s.*
1842	1048	4007	921	6081	8146	511	20,714	40*s.* to 50*s.*
1843	413½	2520	865	745	4276½	.....	8,820	50*s.* to 60*s.*
1844	862	3216	998½	3446	5437	.....	13,959½	45*s.* to 54*s.* 6*d.*
1845	2197	5213	800	12622	9154	.....	29,986	40*s.* to 54*s.* 6*d.*
1846	3052	8274	1368	13925	7731	.....	34,350	32*s.* 6*d.* to 38*s.*
1847	3396	7992	1986	16742	10767	.....	40,883	32*s.* to 38*s.*
1848	2239	1053	425	2906	970	.....	7,593	37*s.* to 63*s.*
1849	2118	4605	750	10455	7660	.....	25,588	44*s.* to 55*s.*
1850	2034	4500	1102	10170	8017	.....	25,823	44*s.* to 50*s.* & 60*s.*

END OF THE FIRST VOLUME.

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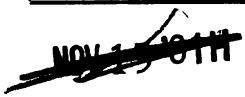
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